

FIG. 1

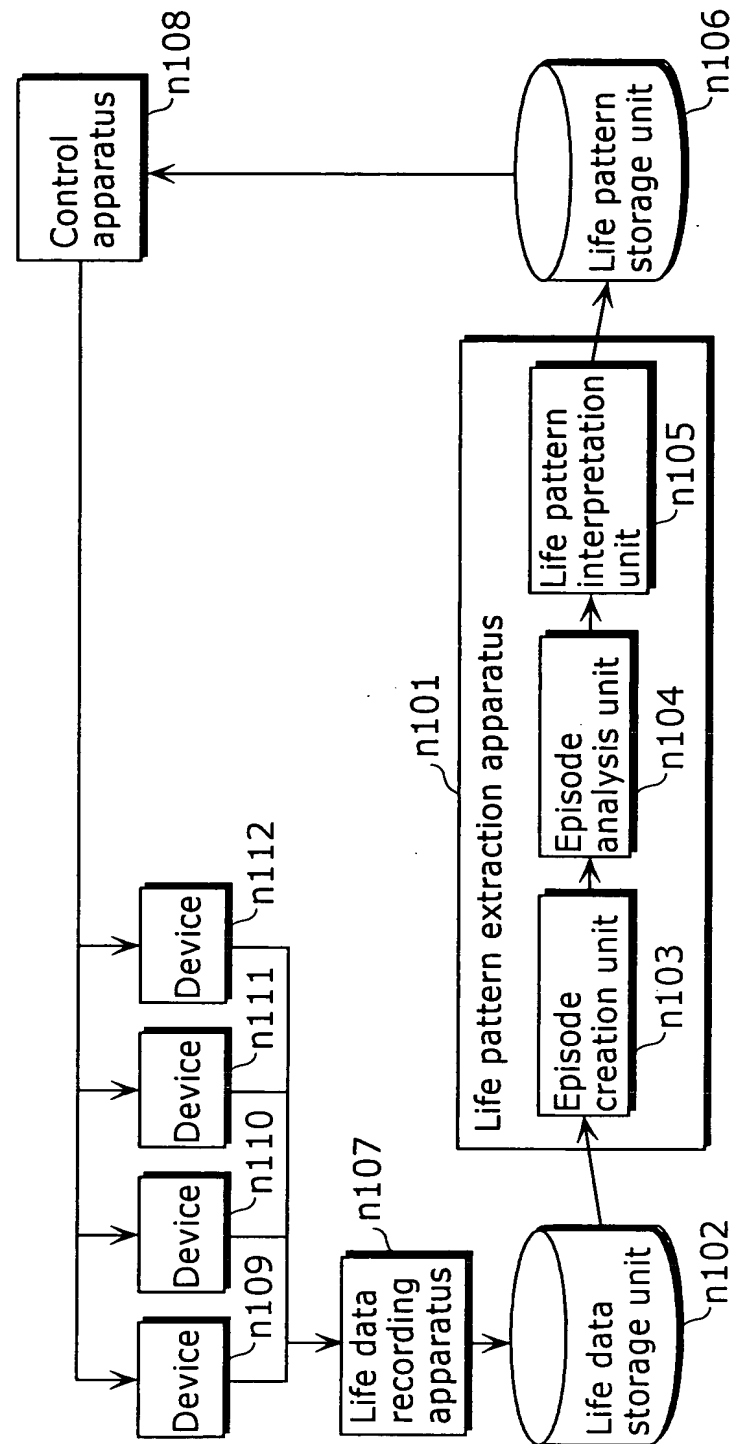


FIG. 2

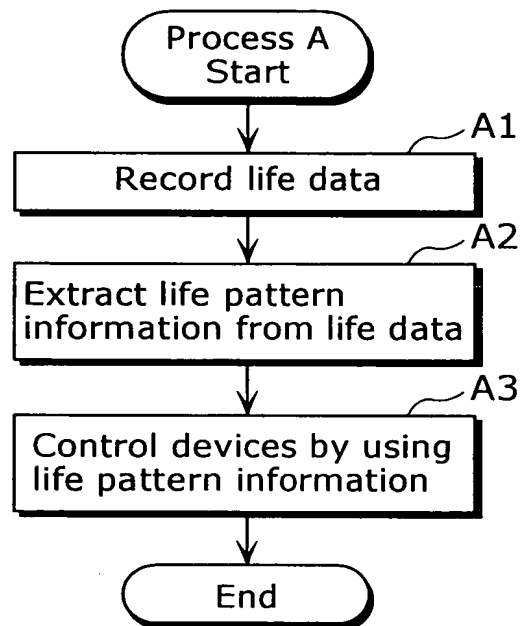


FIG. 3

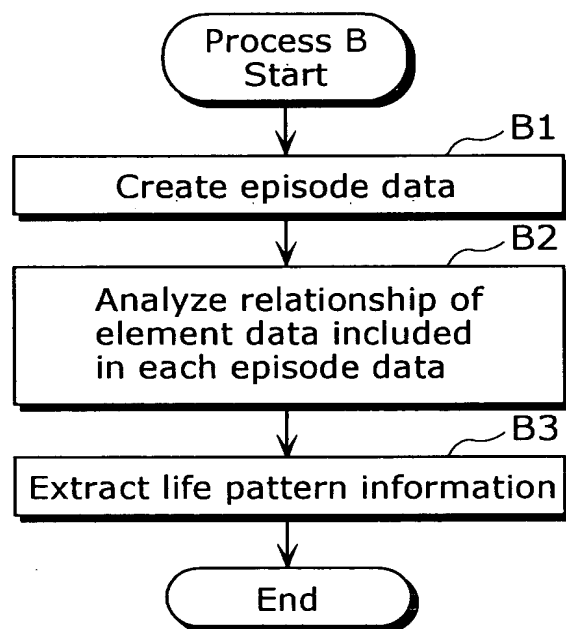


FIG. 4

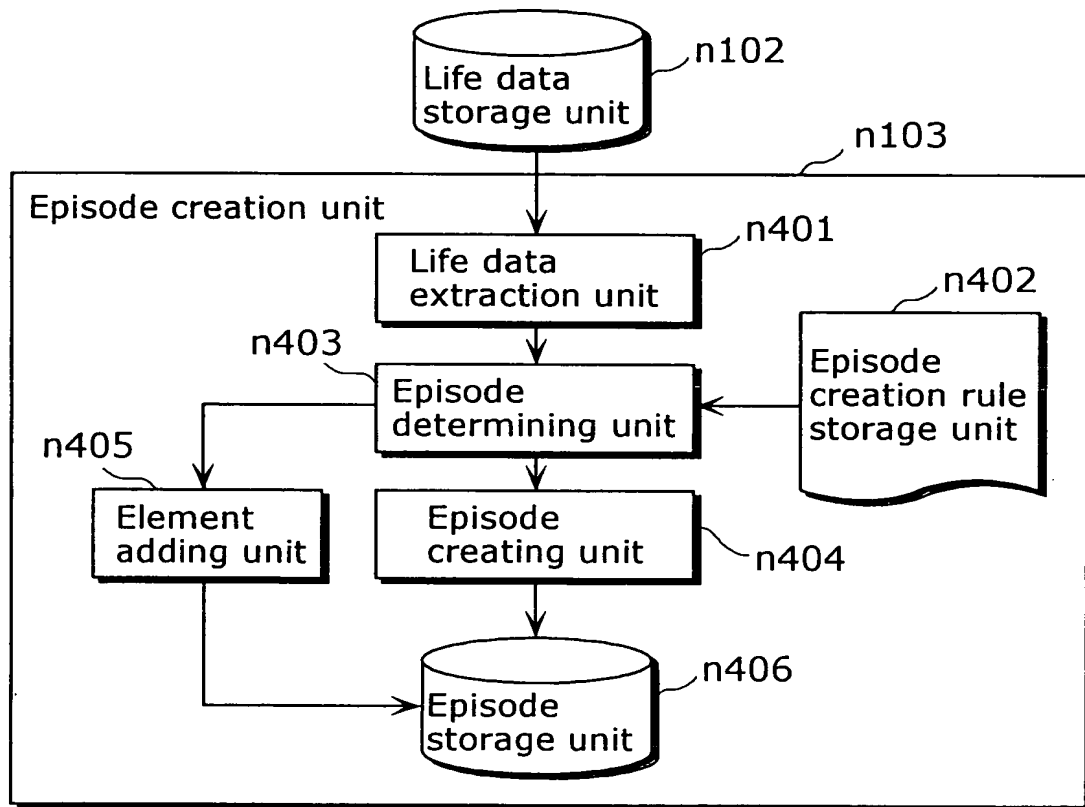


FIG. 5

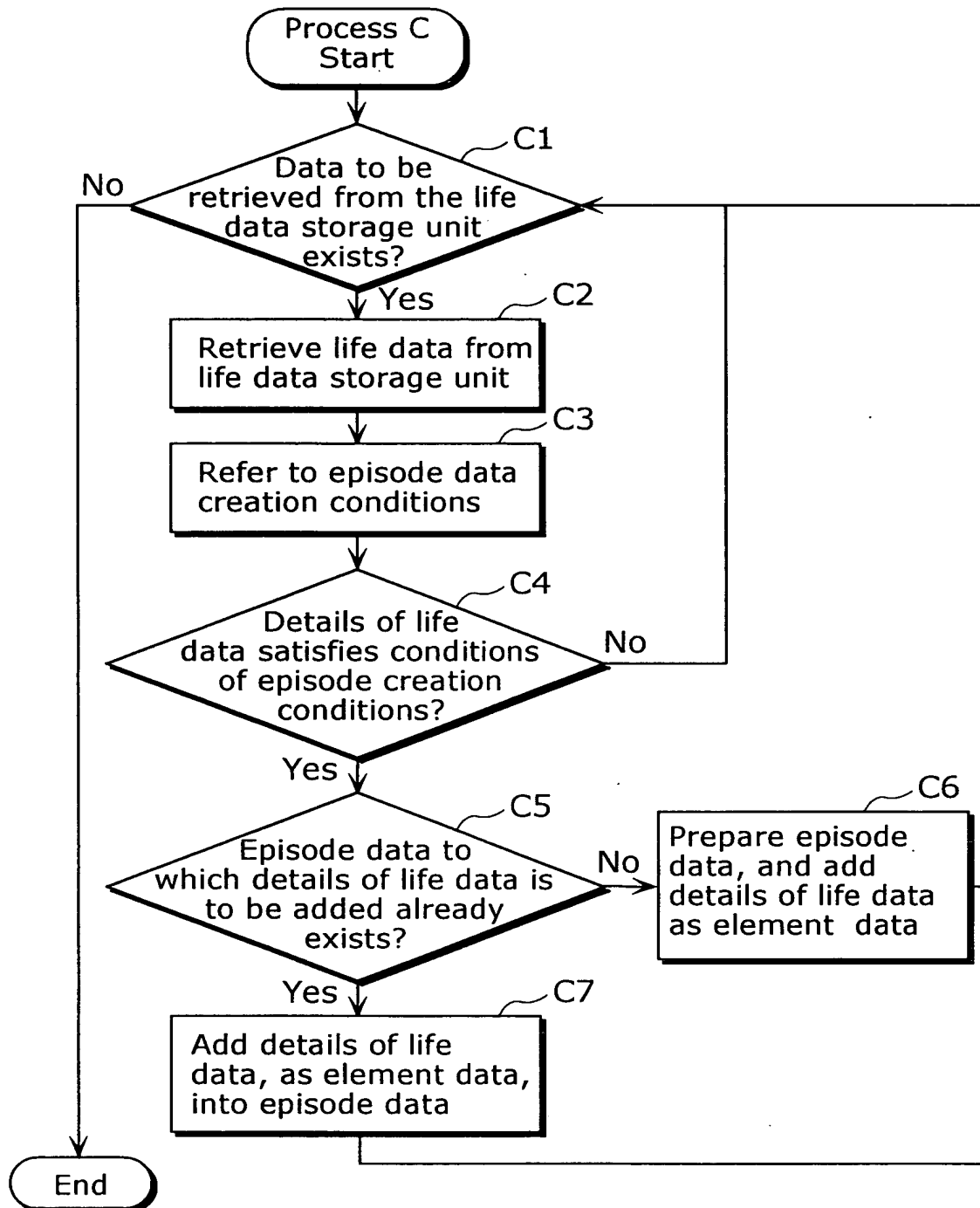


FIG. 6A

<u>Episode creation rules</u>
<ol style="list-style-type: none"><li>1. Add name of device that has had timer function used, into episode data.</li><li>2. Usage time of timer is between 6:00 to 9:00.</li><li>3. Create episode data separated on a per date basis.</li></ol>

FIG. 6B

<u>Episode creation rules</u>
<ol style="list-style-type: none"><li>1. Add name of device that has had power turned-ON into episode data.</li><li>2. Device is used in the living room.</li><li>3. Create episode data separated on a per date basis.</li></ol>

FIG. 6C

<u>Episode creation rules</u>
<ol style="list-style-type: none"><li>1. Title of content played on the DVD player.</li><li>2. Content viewed by the family(plurality of persons)</li><li>3. Create episode data separated on a per date basis.</li></ol>

FIG. 7

Life data

Date and time of operation	Device type	Details of operation	...
2002/08/30 06:10	Light	Timer ON	Data 701
2002/08/30 06:11	Air conditioner	Timer ON	Data 702
2002/08/30 06:15	Rice cooker	Timer ON	Data 703
2002/08/30 07:00	Cooking range	Power ON	Data 704
2002/08/30 07:01	Television	Power ON	Data 705
2002/08/30 08:30	Air conditioner	Power OFF	Data 706
2002/08/30 08:31	Light	Power OFF	Data 707
:	:	:	
2002/08/31 06:45	Alarm clock	Timer ON	Data 708
2002/08/31 06:45	Air conditioner	Timer ON	Data 709
2002/08/31 07:00	Rice cooker	Timer ON	Data 710
2002/08/31 07:05	Television	Timer ON	Data 711
2002/08/31 08:00	Television	Power OFF	Data 712
:	:	:	

FIG. 8

Episode data	
Episode name {element data 1, element data 2,..., element data n}	
8/30	{Light, air conditioner, rice cooker}
8/31	{Alarm clock, air conditioner, rice cooker, television}
9/1	{Light, alarm clock, air conditioner, rice cooker, radio}
9/2	{Light, air conditioner, rice cooker, radio}
9/3	{Alarm clock, air conditioner, rice cooker, television}
9/4	{Alarm clock, air conditioner, rice cooker, radio}



FIG. 9

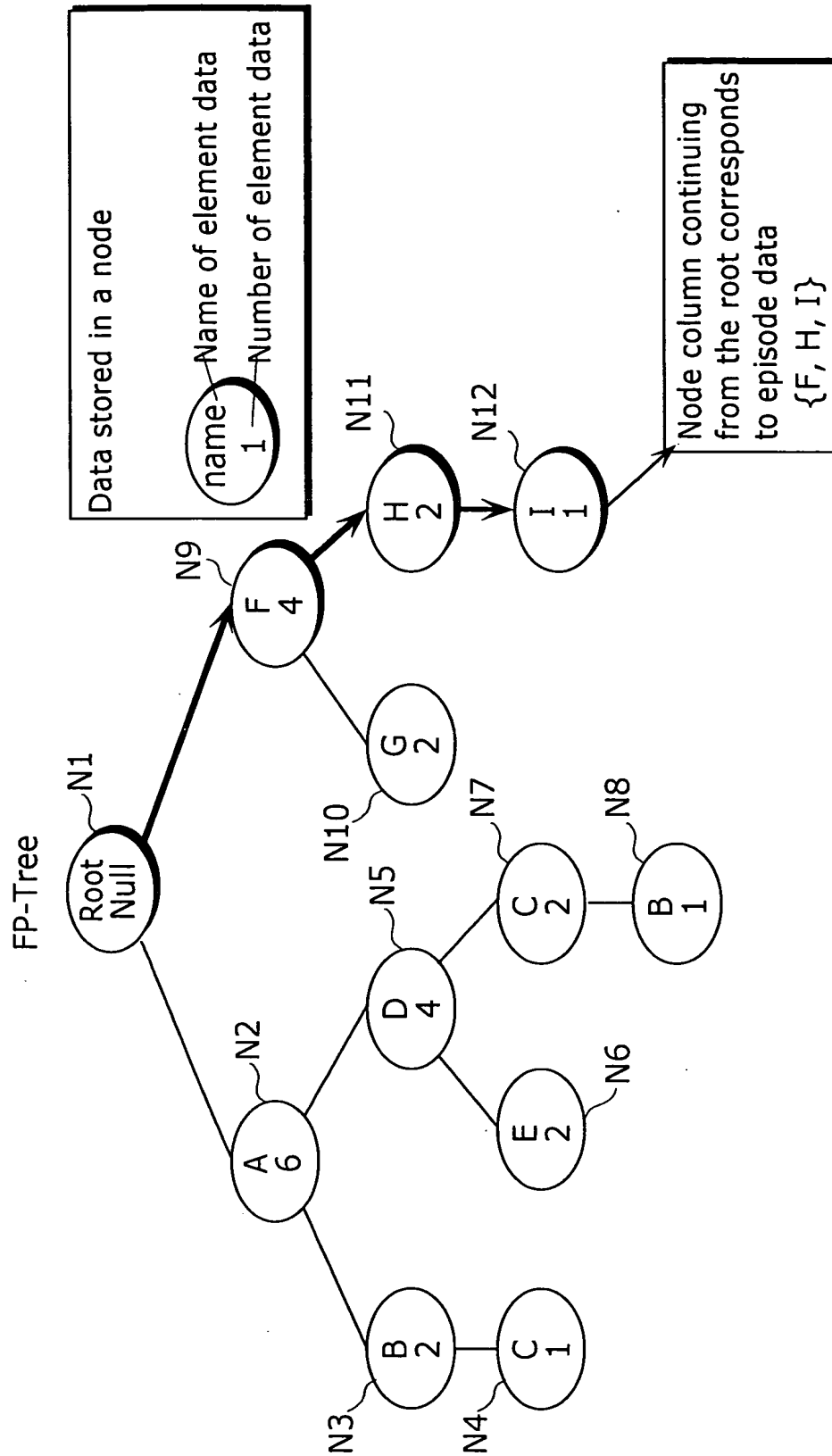


FIG. 10

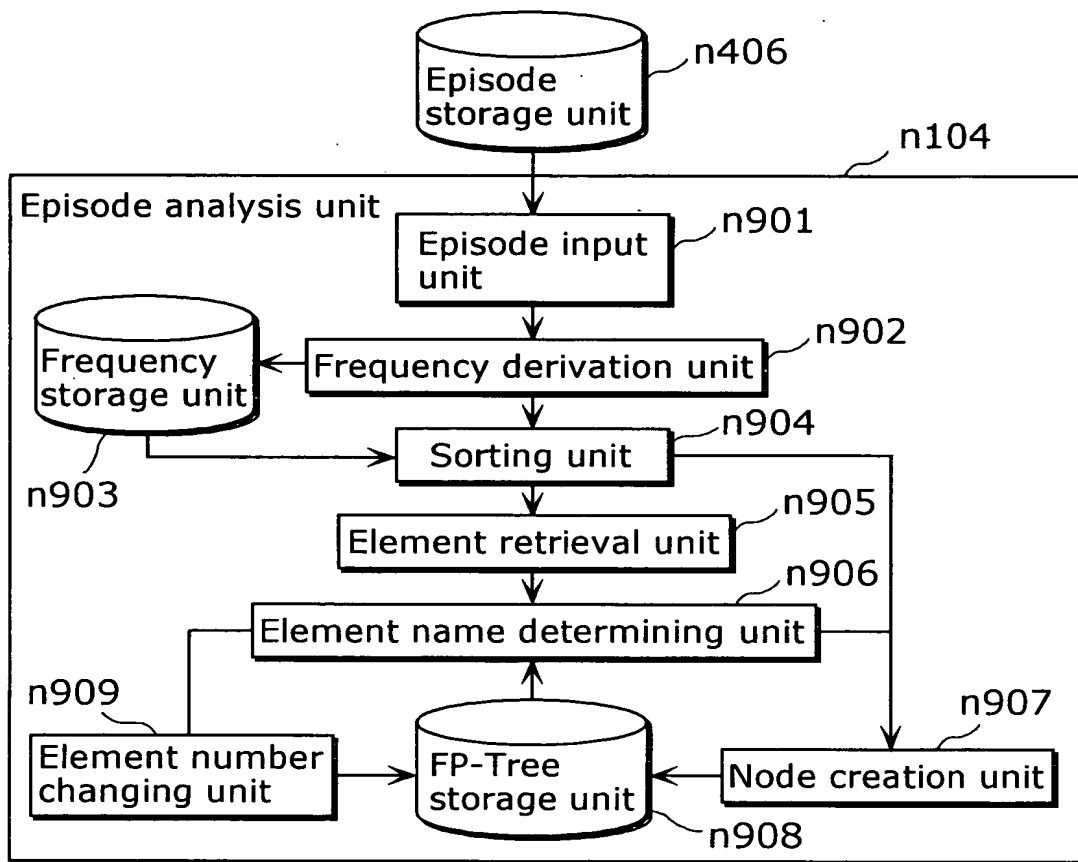


FIG. 11

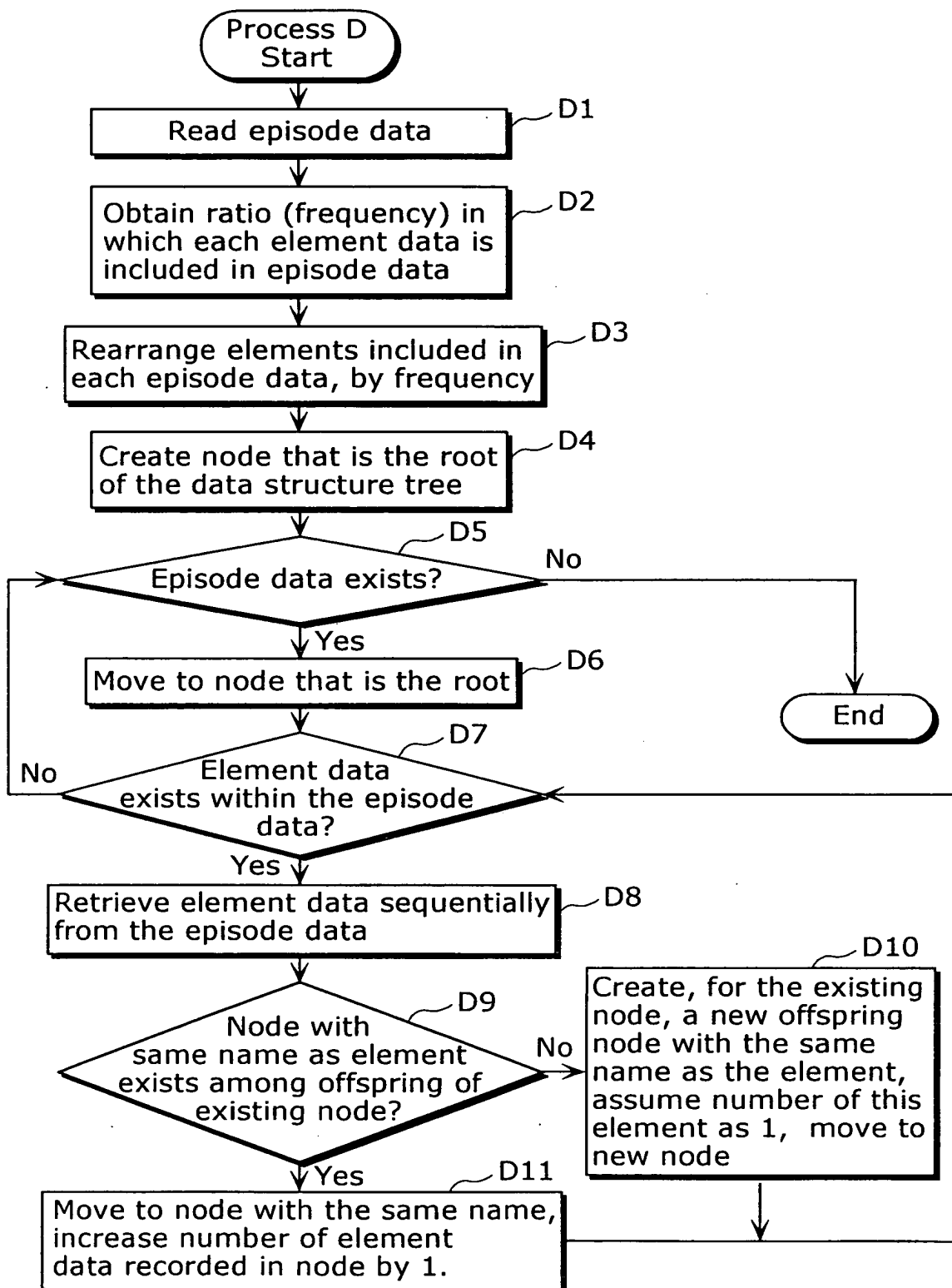


FIG. 12

Element name	Light	Air conditioner	Rice cooker	Alarm clock	Television	Radio
Frequency	0.5	1.0	1.0	0.5	0.33	0.33

FIG. 13

## Episode data

8/ 30 {Light, air conditioner, rice cooker}  
8/ 31 {Alarm clock, air conditioner, rice cooker, television}  
9/ 1 {Light, alarm clock, air conditioner, rice cooker, radio}  
9/ 2 {Light, air conditioner, rice cooker, radio}  
9/ 3 {Alarm clock, air conditioner, rice cooker, television}  
9/ 4 {Alarm clock, air conditioner, rice cooker, radio}



## Episode data

8/ 30 {Air conditioner, rice cooker, light}  
8/ 31 {Air conditioner, rice cooker, alarm clock, television}  
9/ 1 {Air conditioner, rice cooker, alarm clock, light, radio}  
9/ 2 {Air conditioner, rice cooker, light, radio}  
9/ 3 {Air conditioner, rice cooker, alarm clock, television}  
9/ 4 {Air conditioner, rice cooker, alarm clock, radio}

FIG. 14

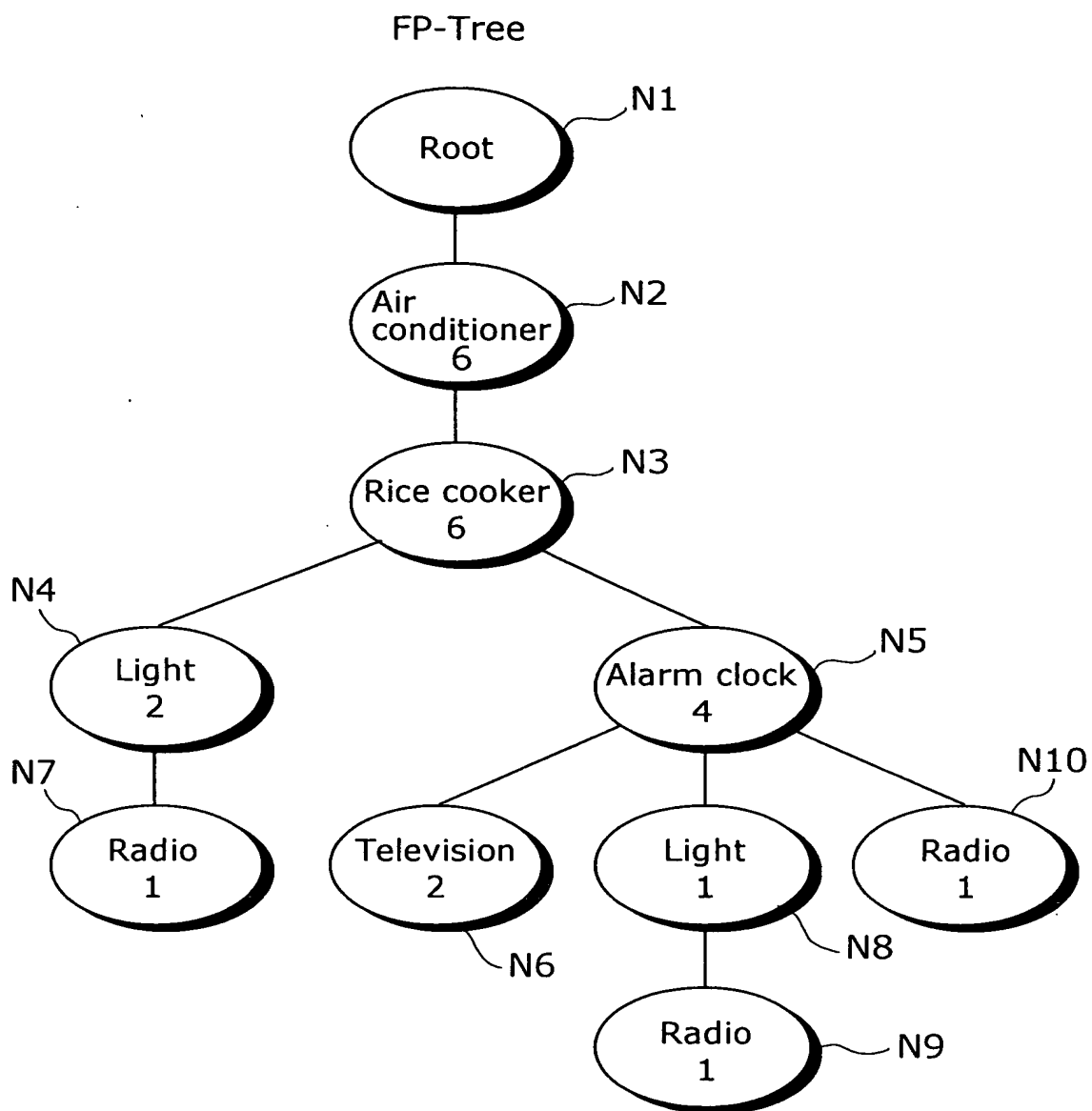


FIG. 15

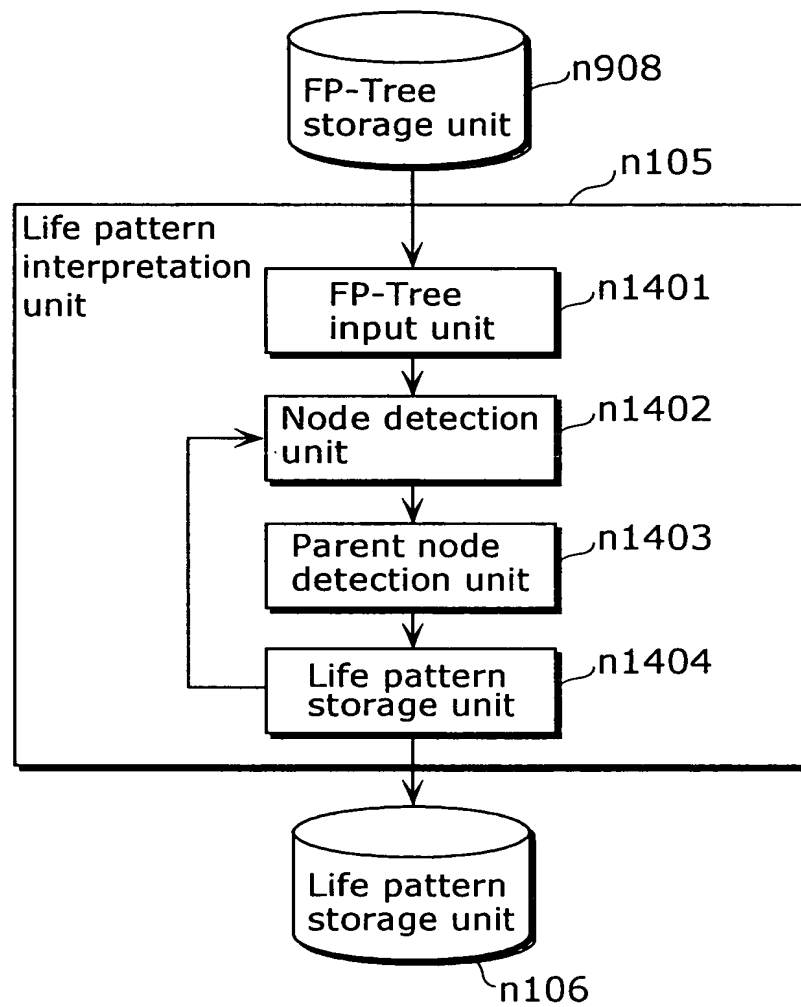


FIG. 16

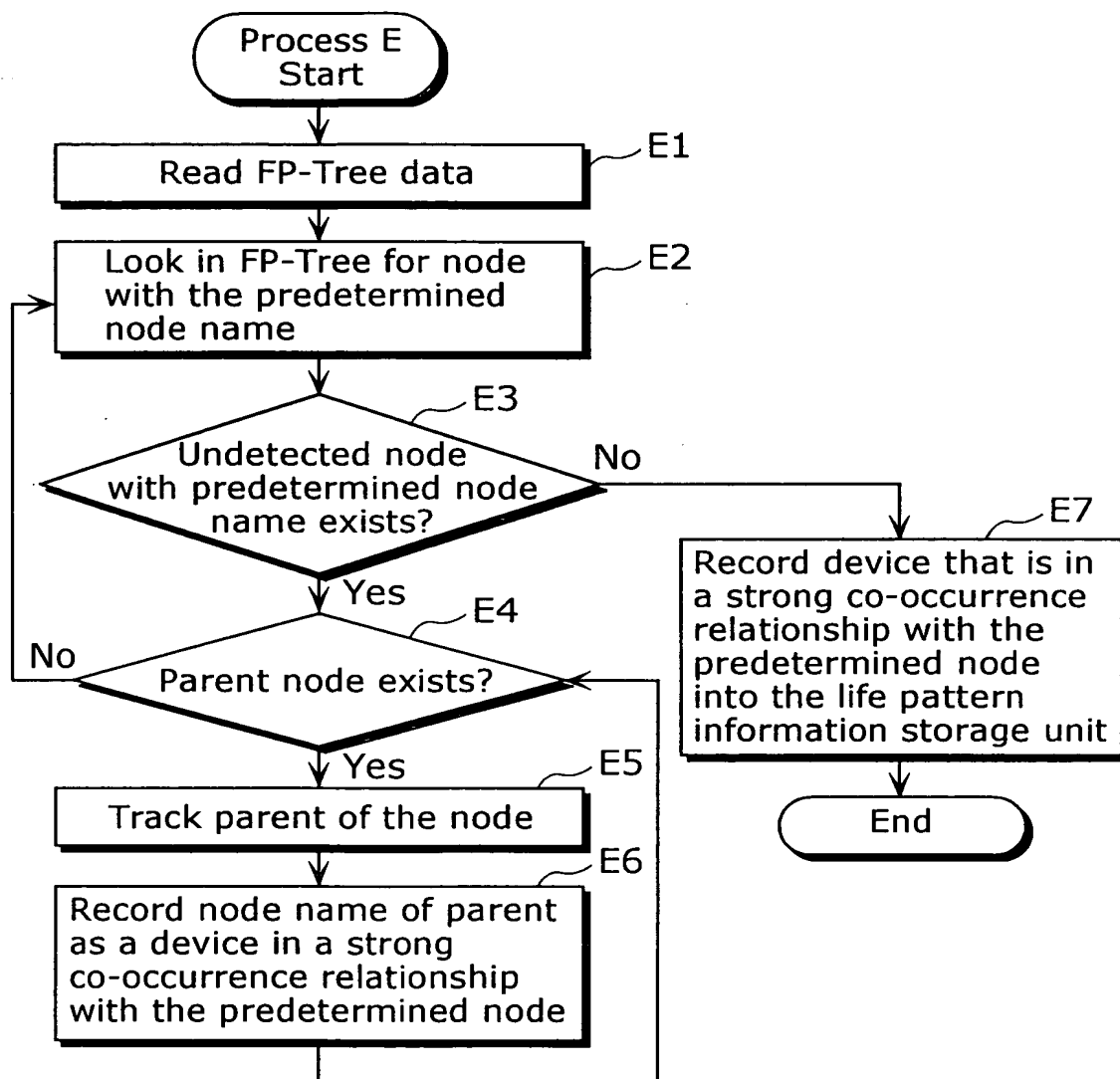




FIG. 17

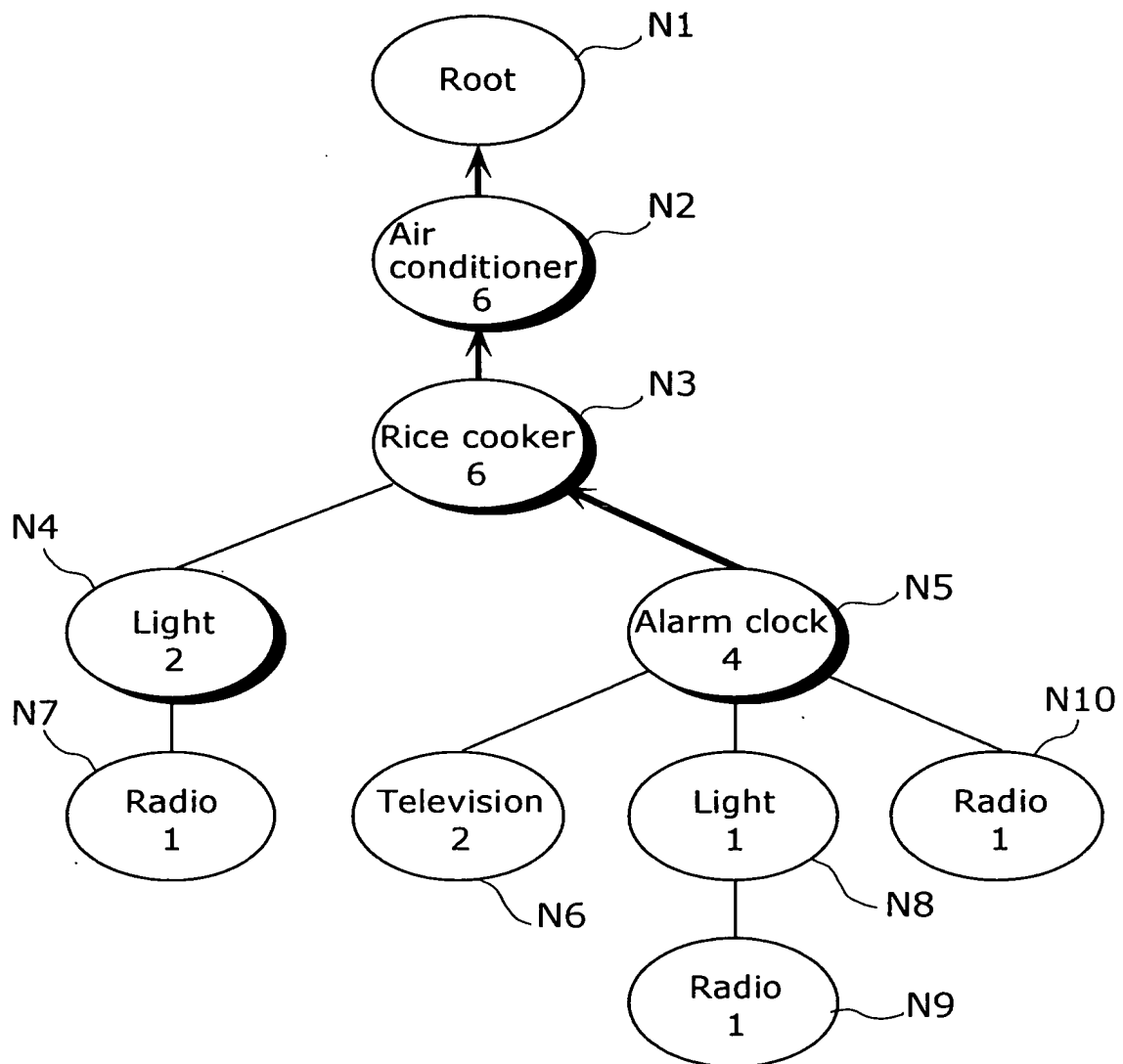


FIG. 18

Life pattern information

Devices used together with the alarm  
clock in the morning (6:00 to 9:00)

{Air conditioner, rice cooker}

FIG. 19

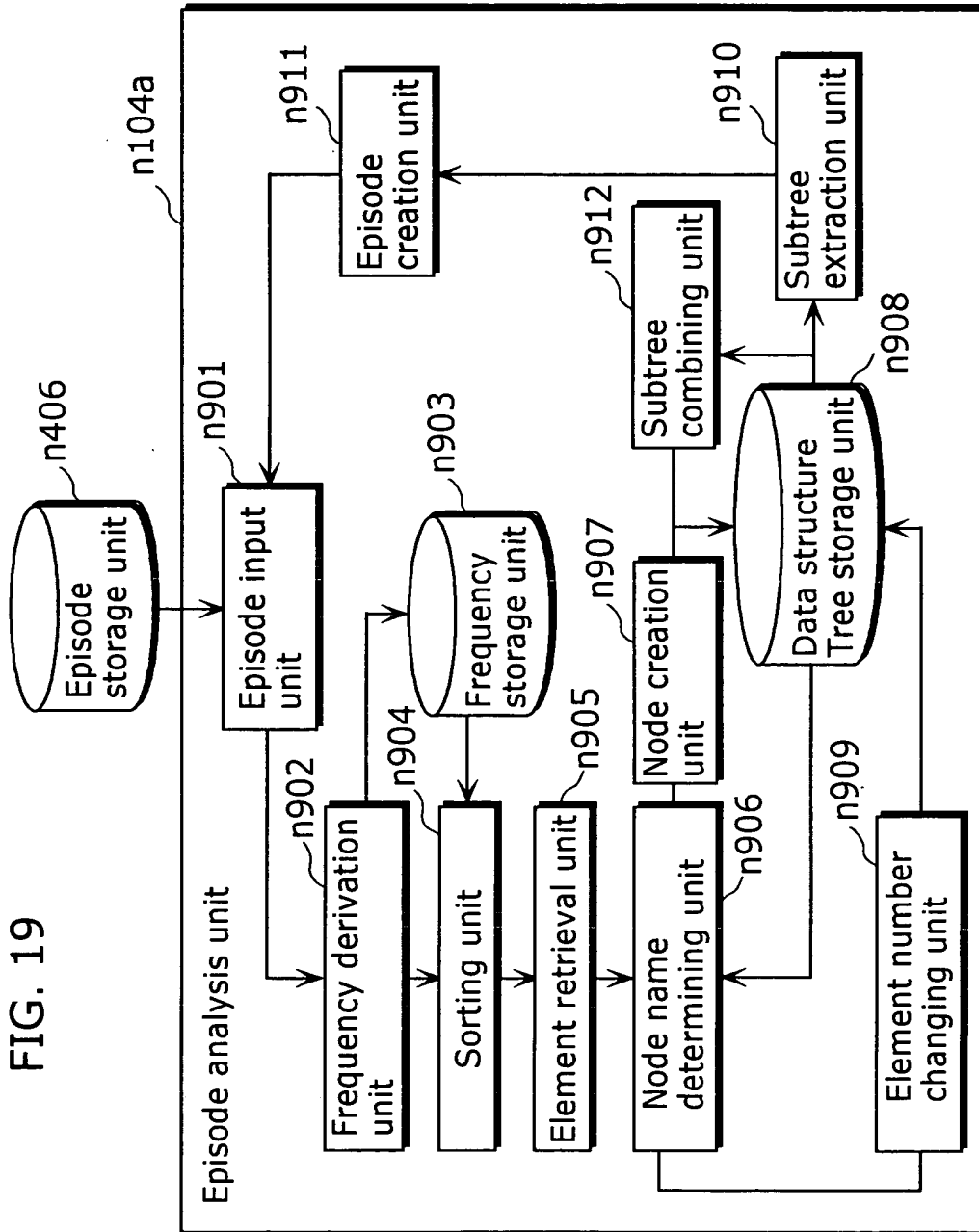


FIG. 20

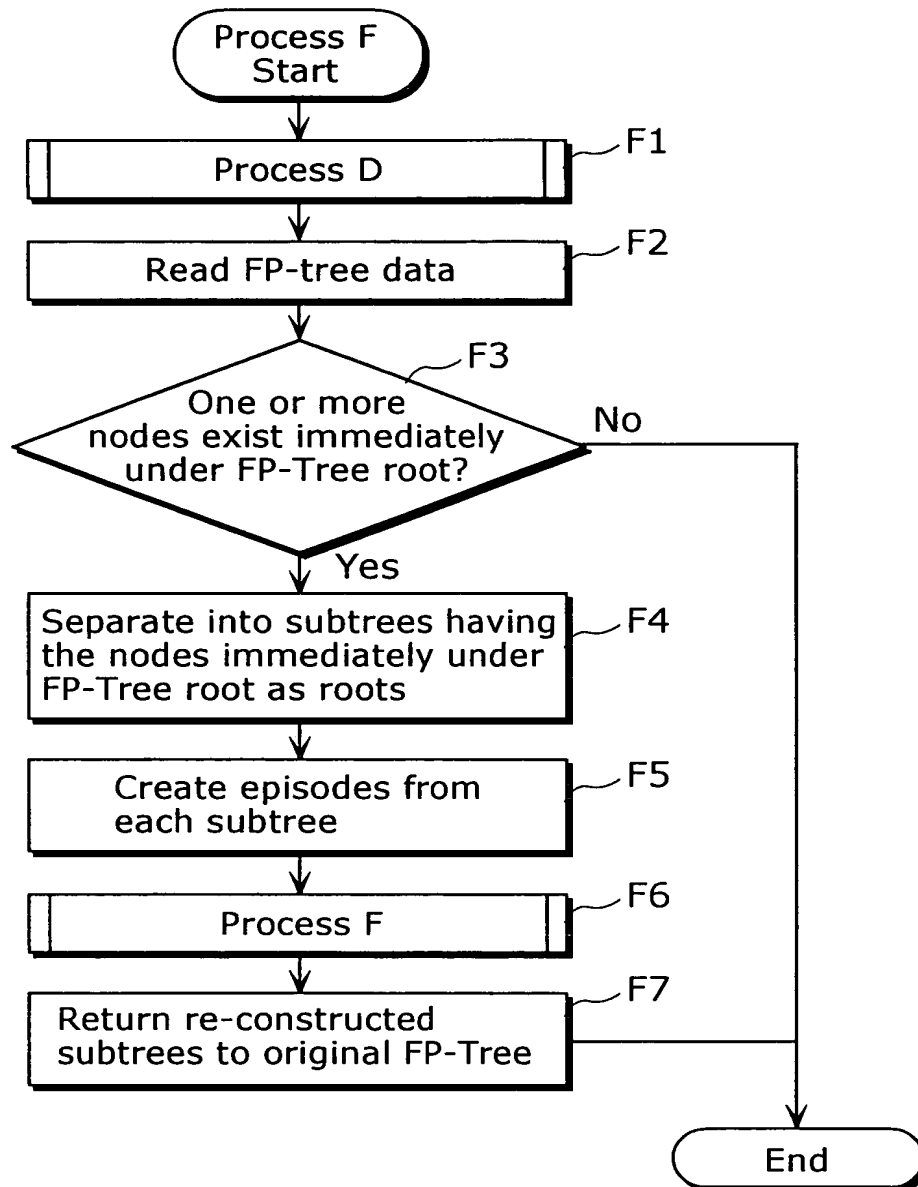


FIG. 21

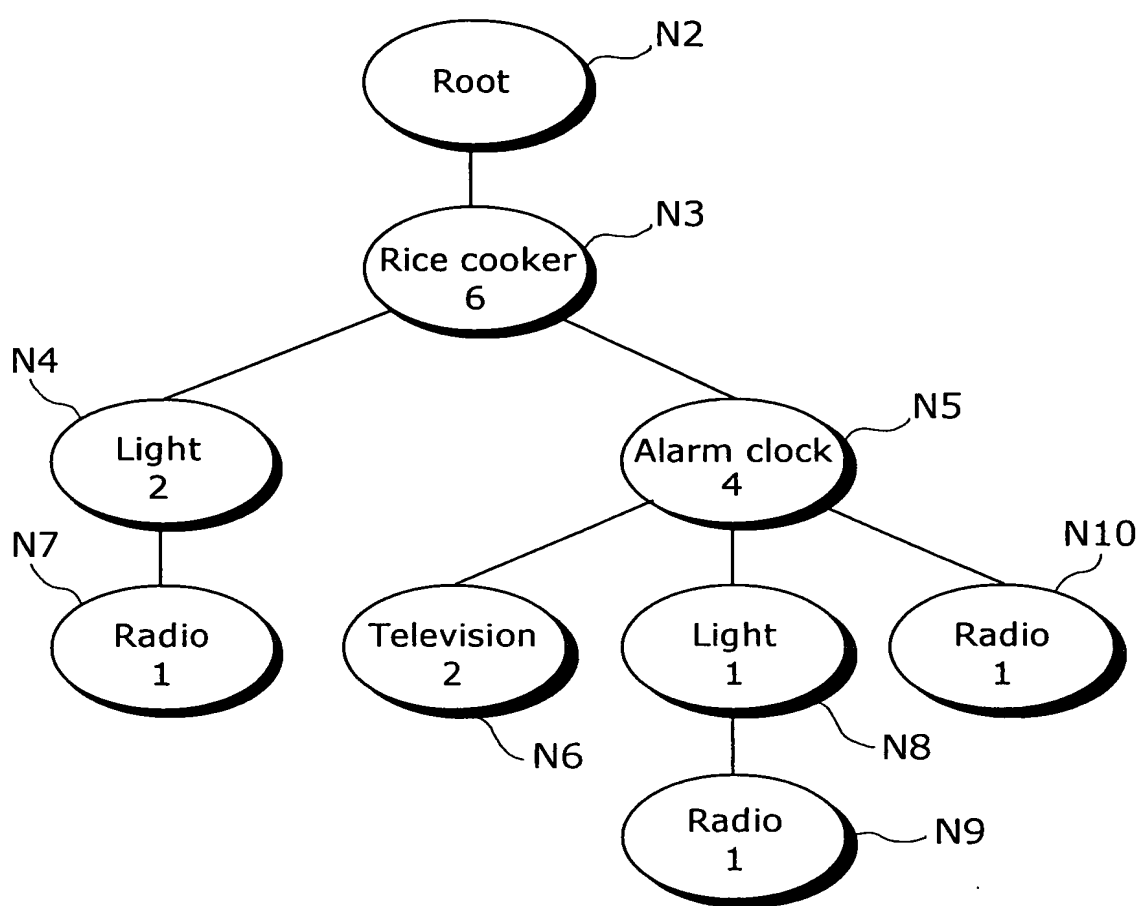


FIG. 22

**Episode data**

8/ 30 {Rice cooker, light}  
8/ 31 {Rice cooker, alarm clock, television}  
9/ 1 {Rice cooker, alarm clock, light, radio}  
9/ 2 {Rice cooker, light, radio}  
9/ 3 {Rice cooker, alarm clock, television}  
9/ 4 {Rice cooker, alarm clock, radio}

FIG. 23A

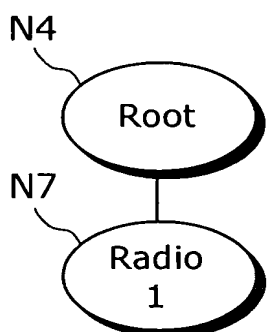


FIG. 23B

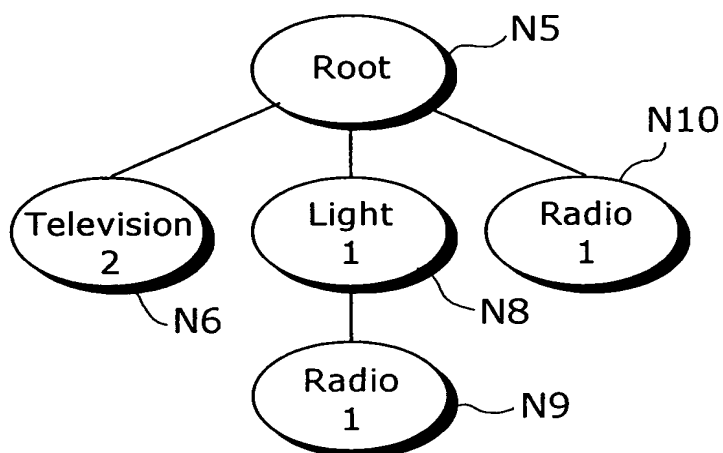


FIG. 24A

Episode data	
8/ 30	{}
9/ 2	{Radio}

FIG. 24B

Episode data	
8/ 31	{Television}
9/ 1	{Light, radio}
9/ 3	{Television}
9/ 4	{Radio}



FIG. 25

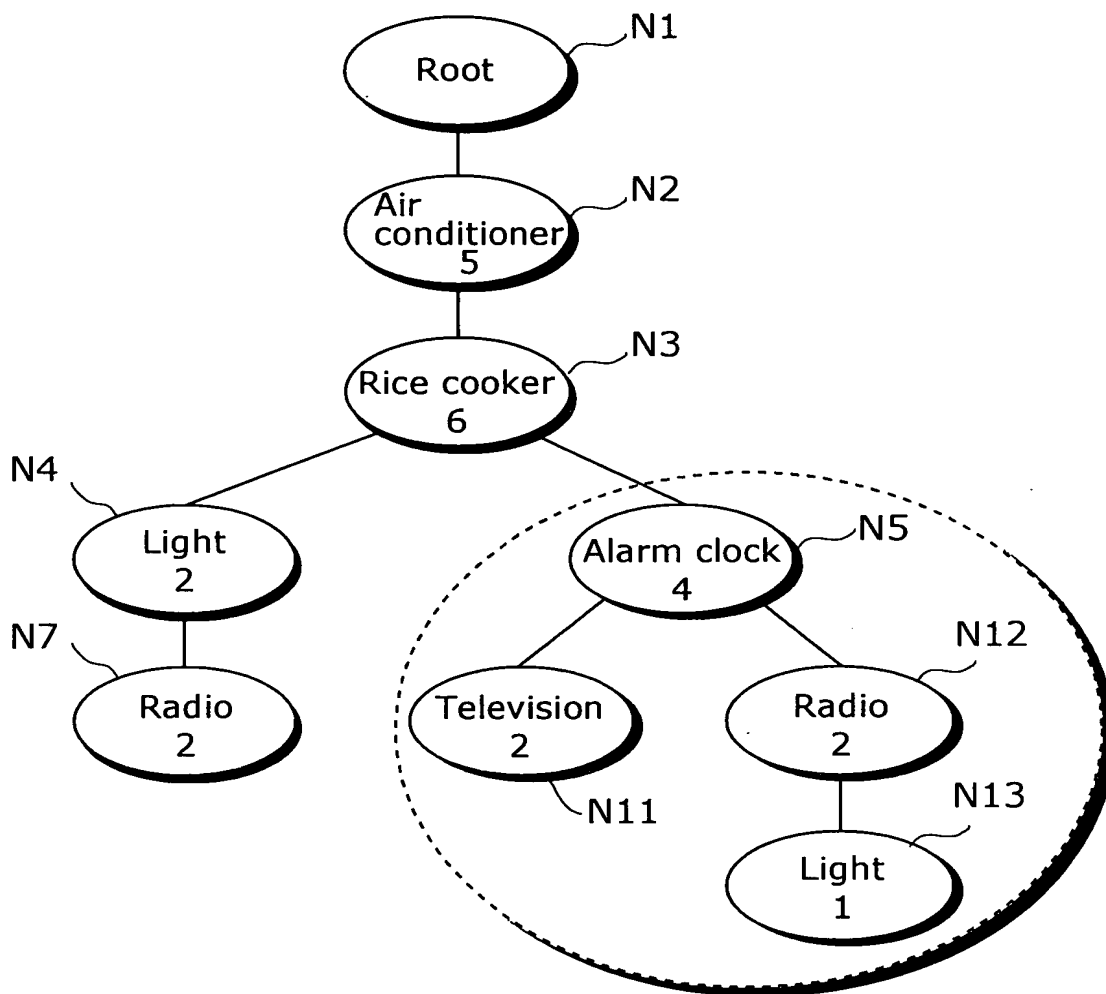
Subtree optimization  
FP-Tree

FIG. 26B  
Subtree optimization  
Fp-Tree

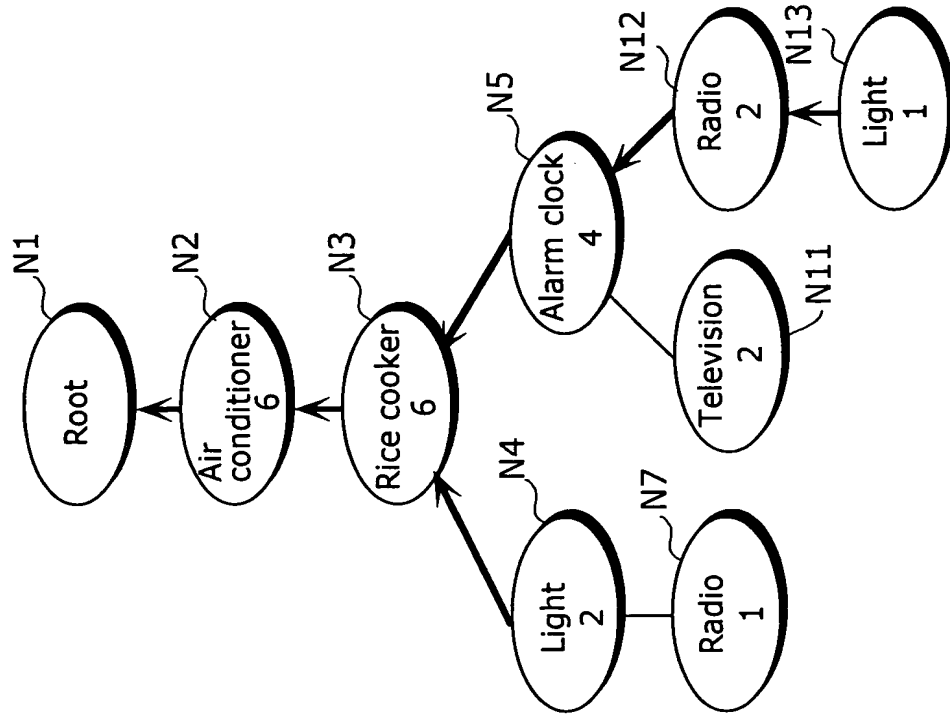


FIG. 26A  
FP-Tree

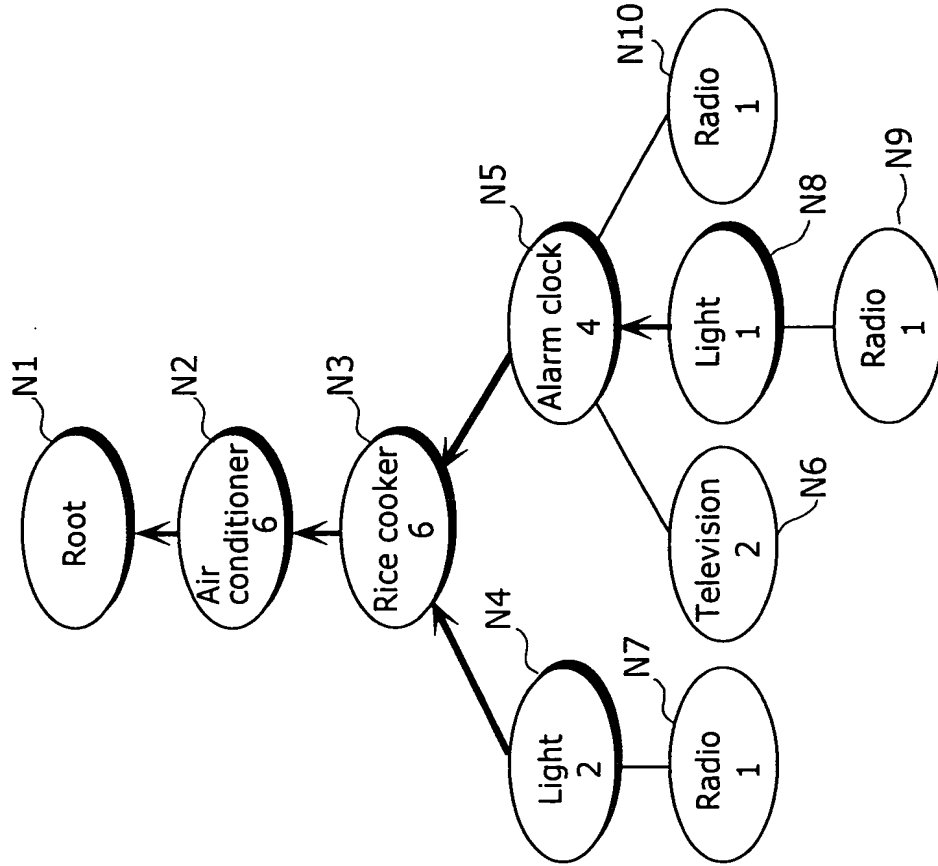


FIG. 27A

FP-Tree

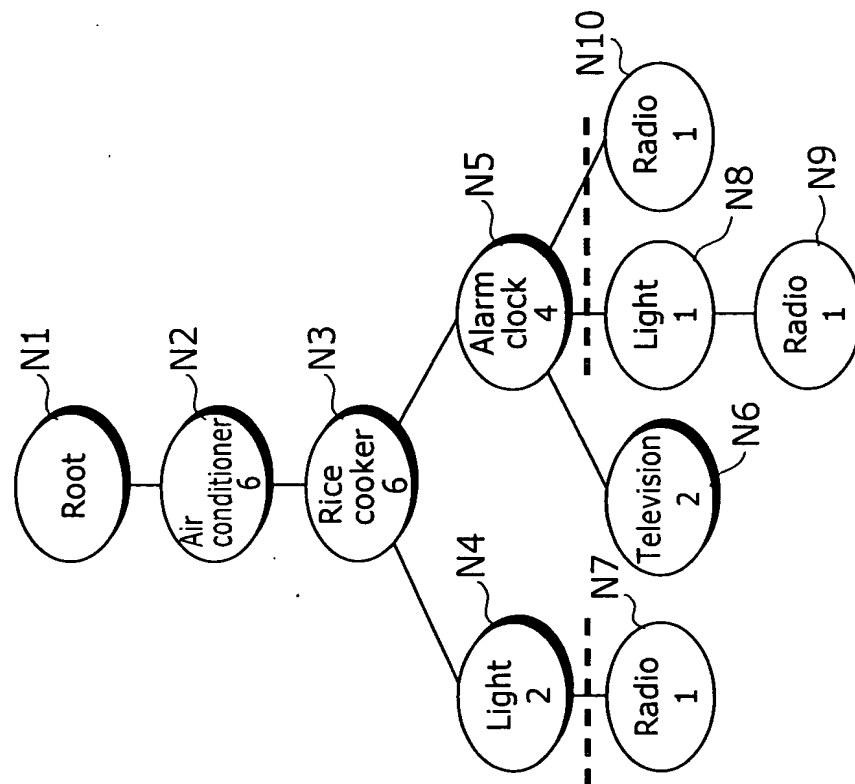


FIG. 27B

Subtree optimization  
FP-Tree

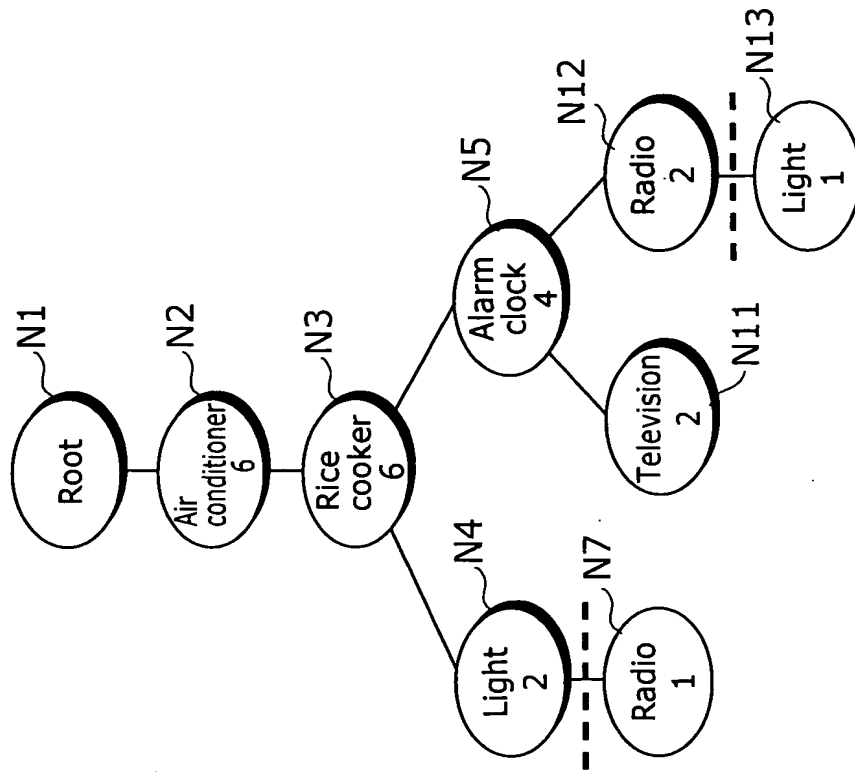


FIG. 28

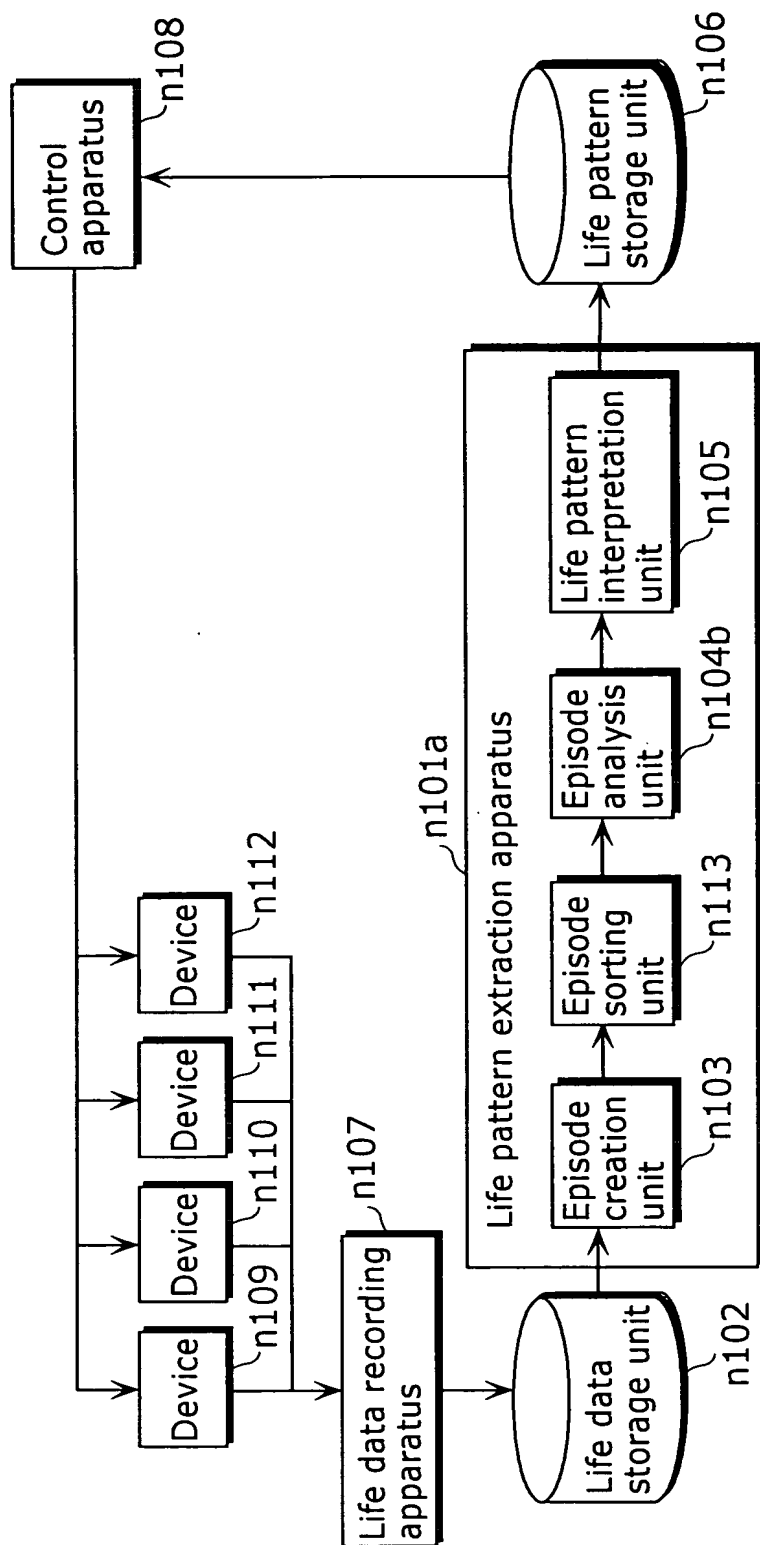


FIG. 29

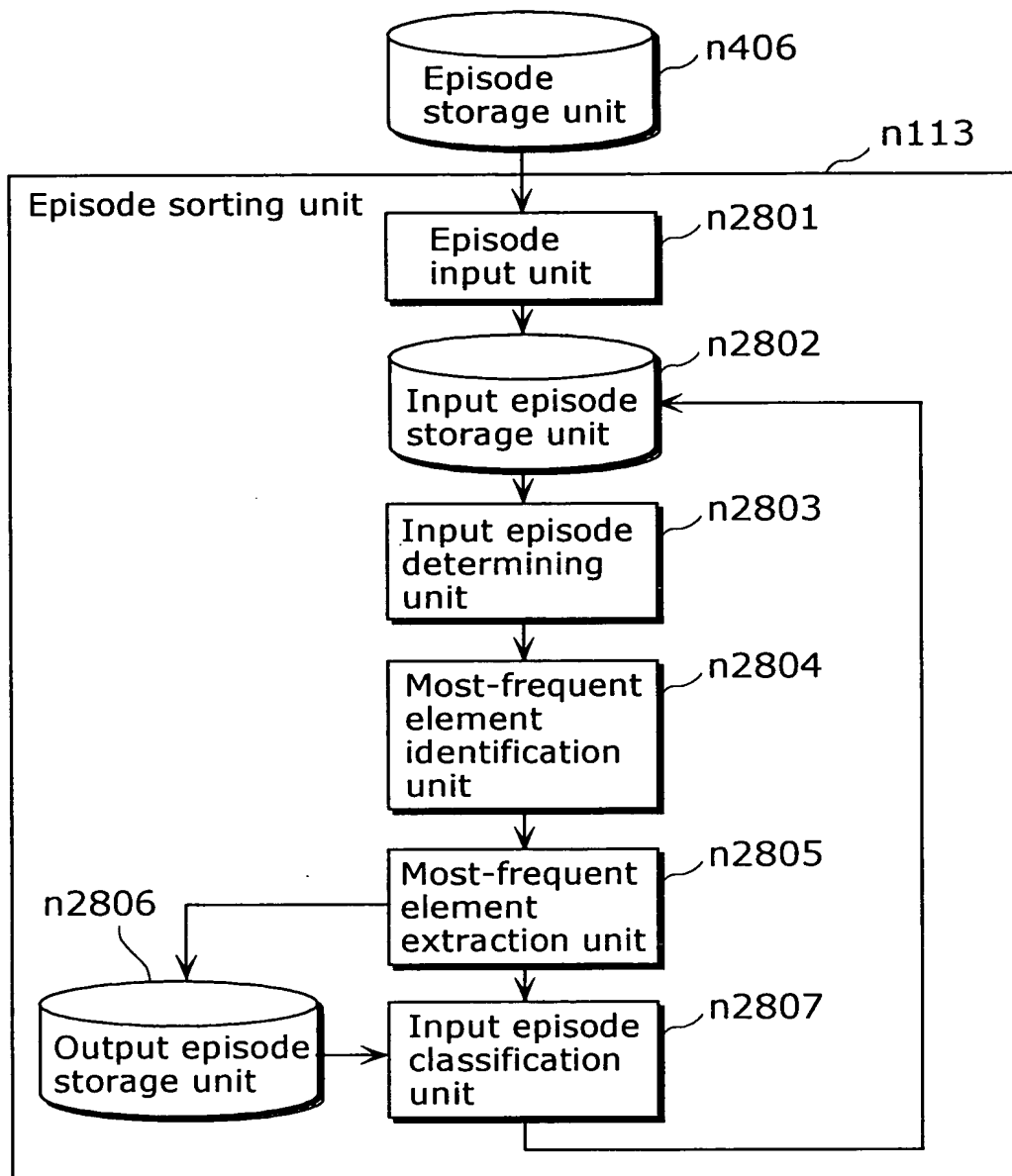


FIG. 30

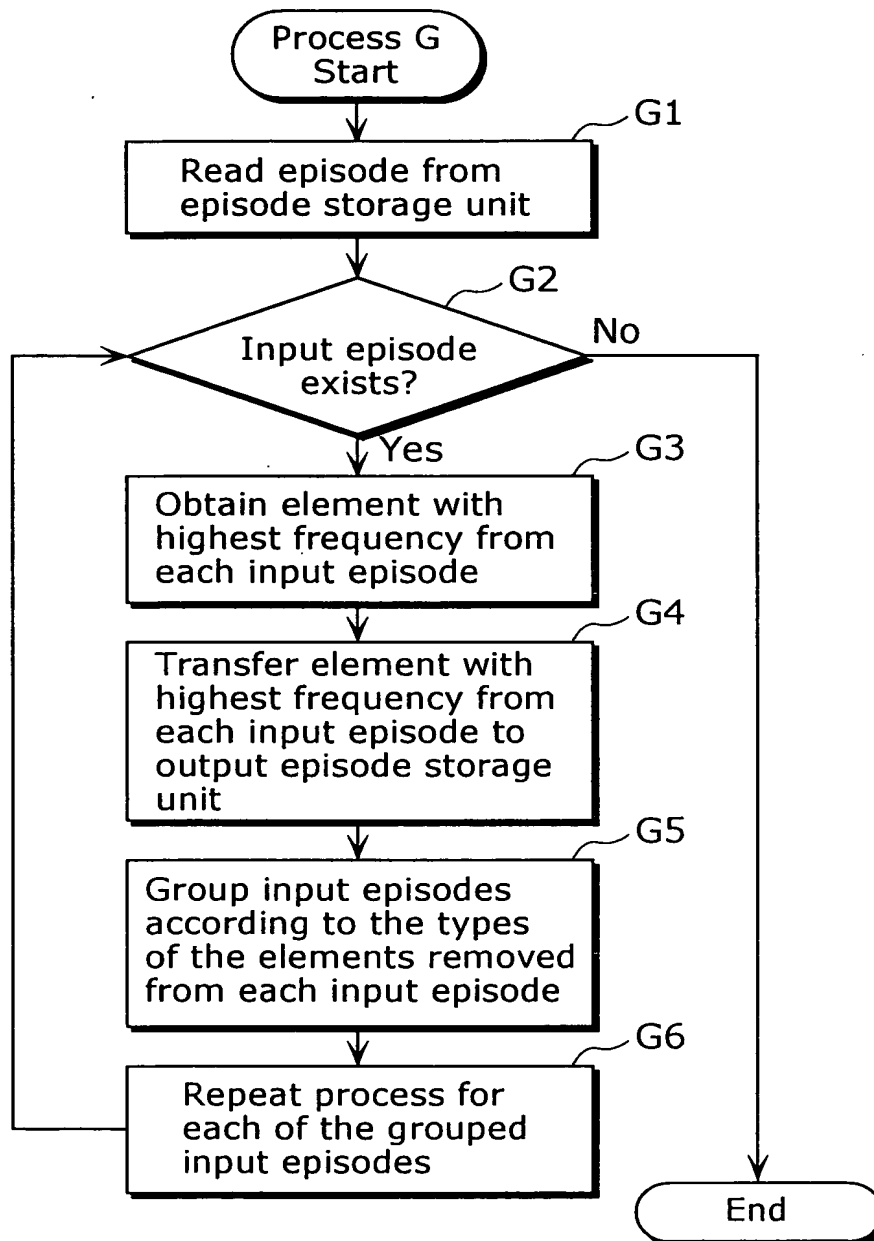


FIG. 31

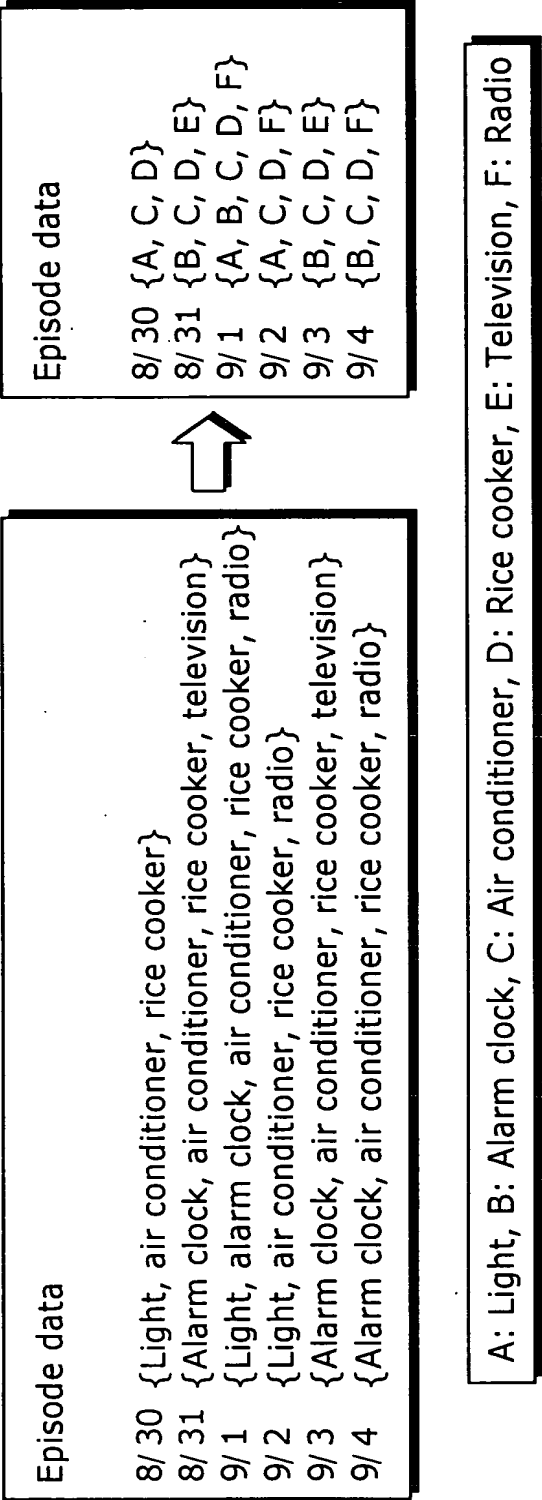


FIG. 32

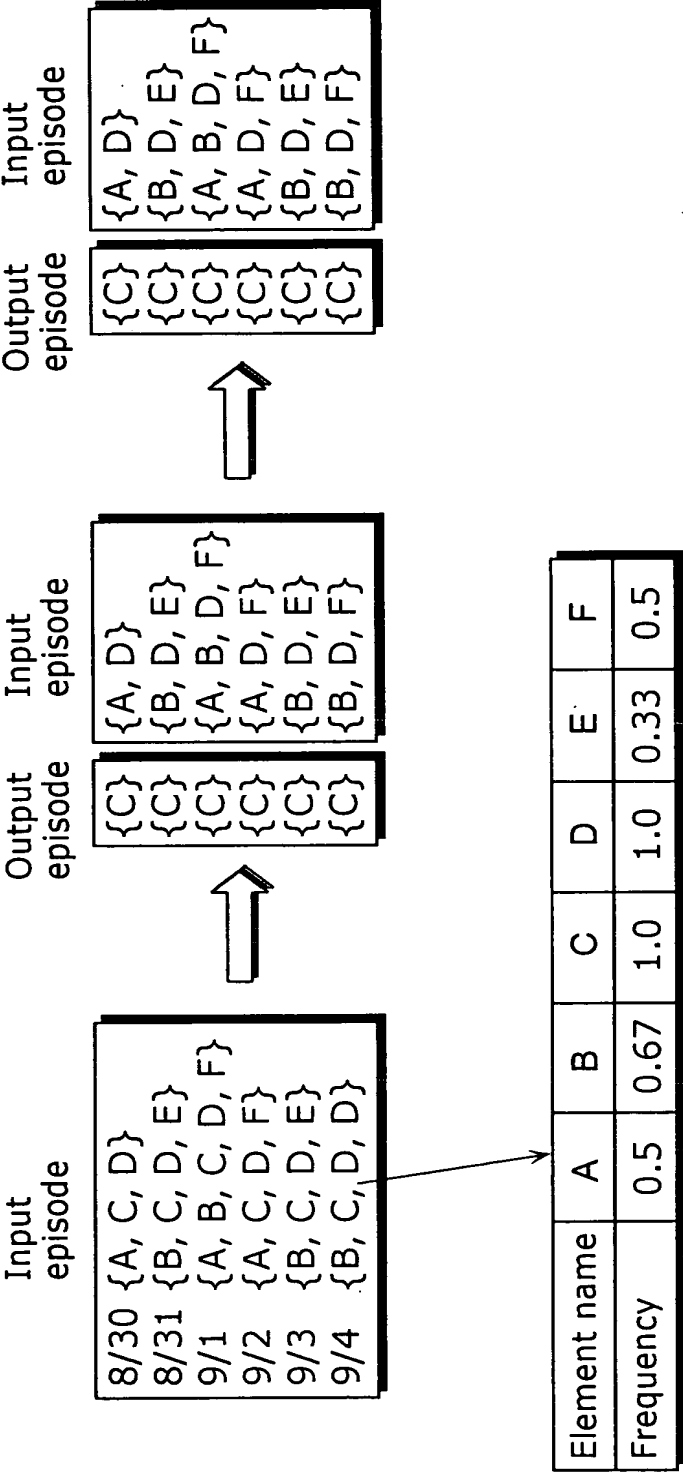




FIG. 33

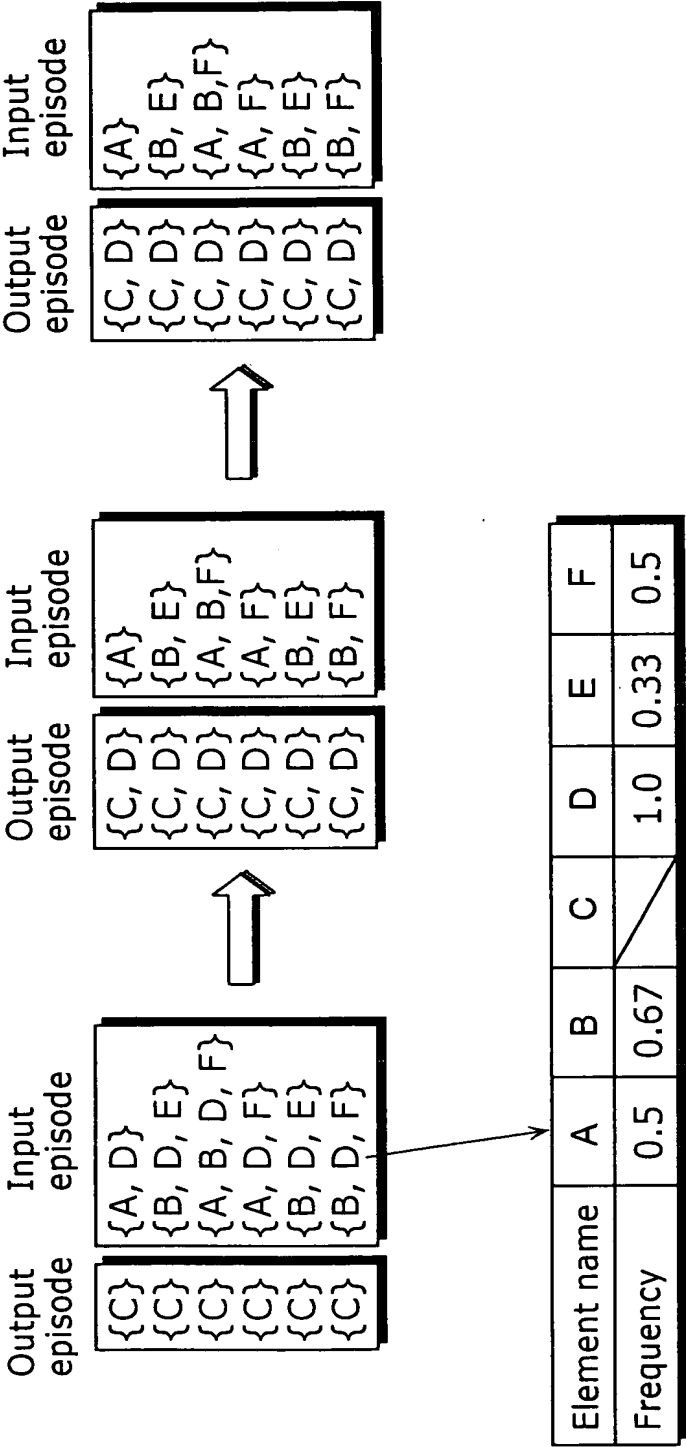


FIG. 34

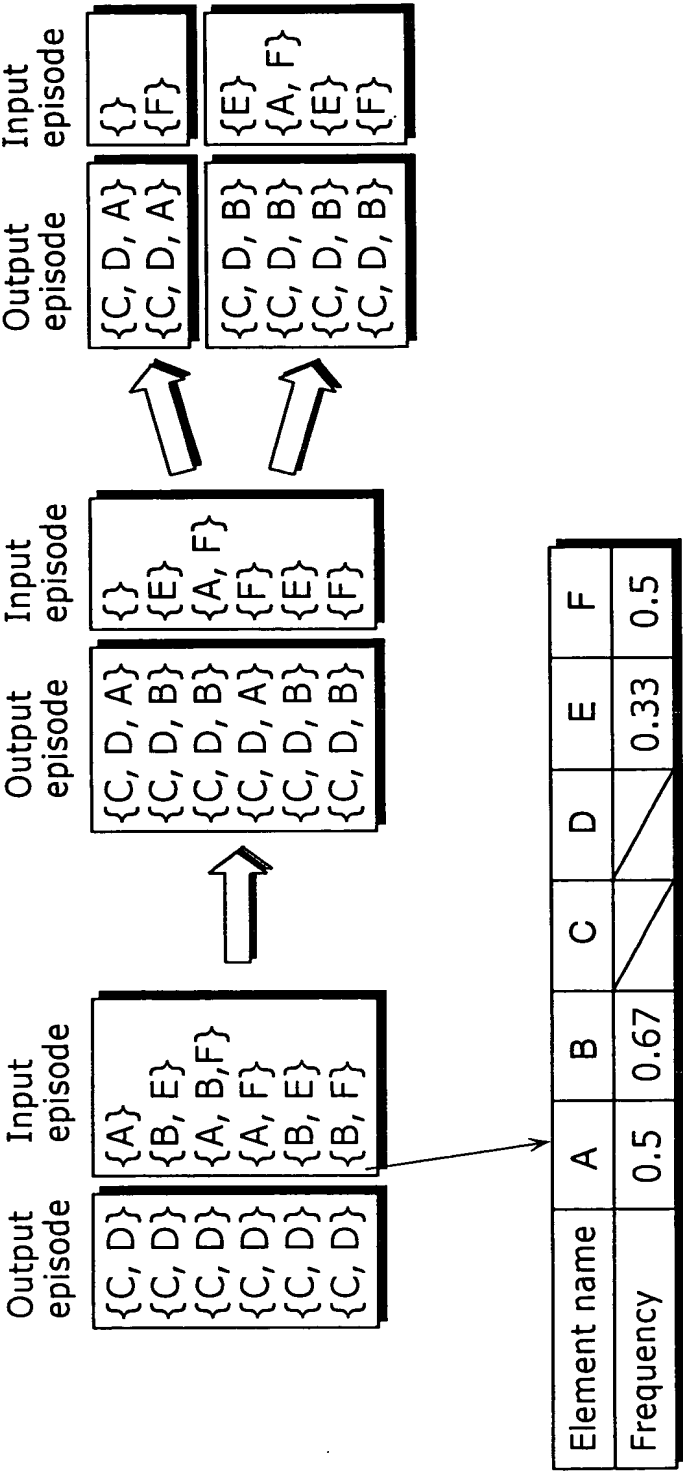


FIG. 35

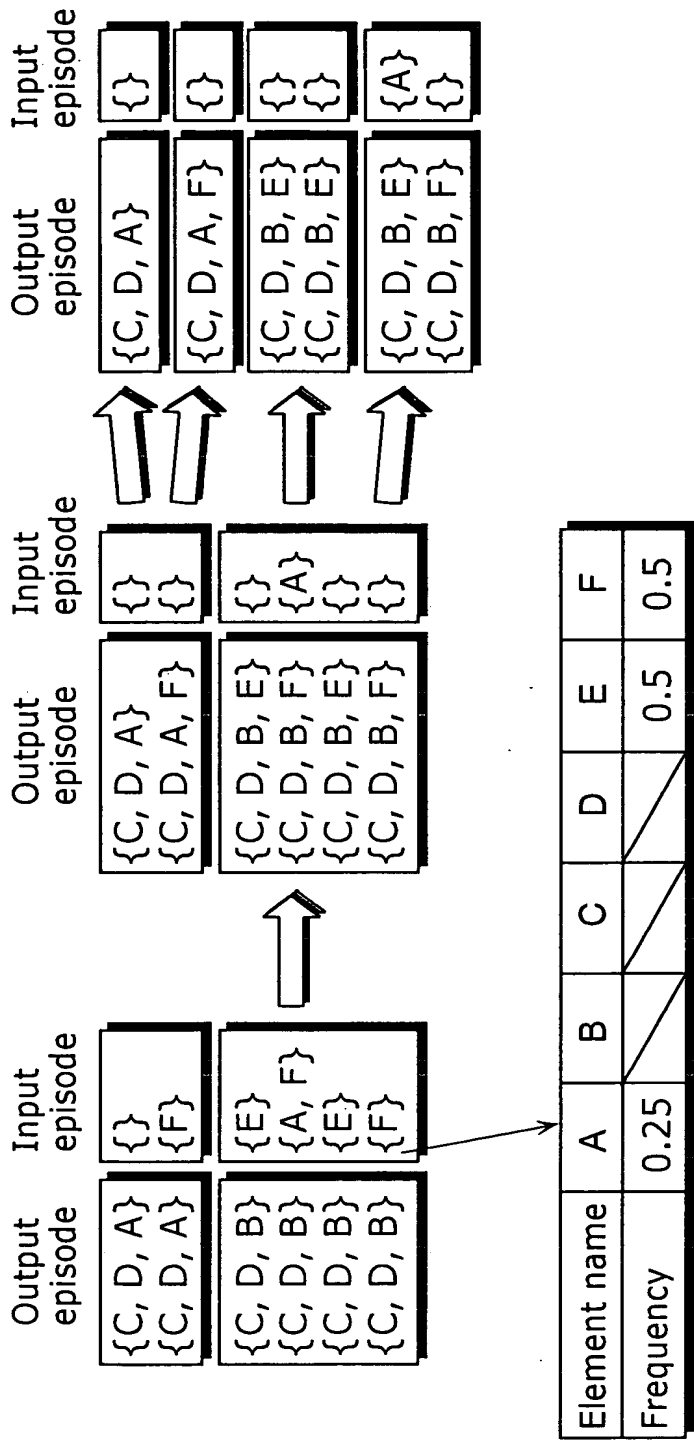


FIG. 36

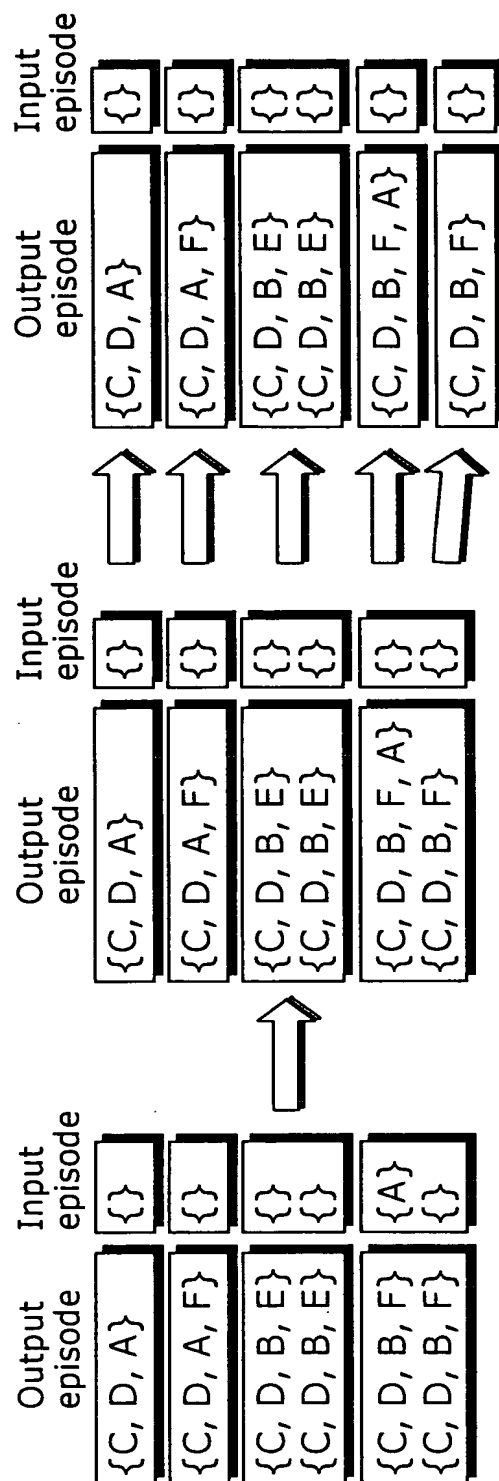


FIG. 37

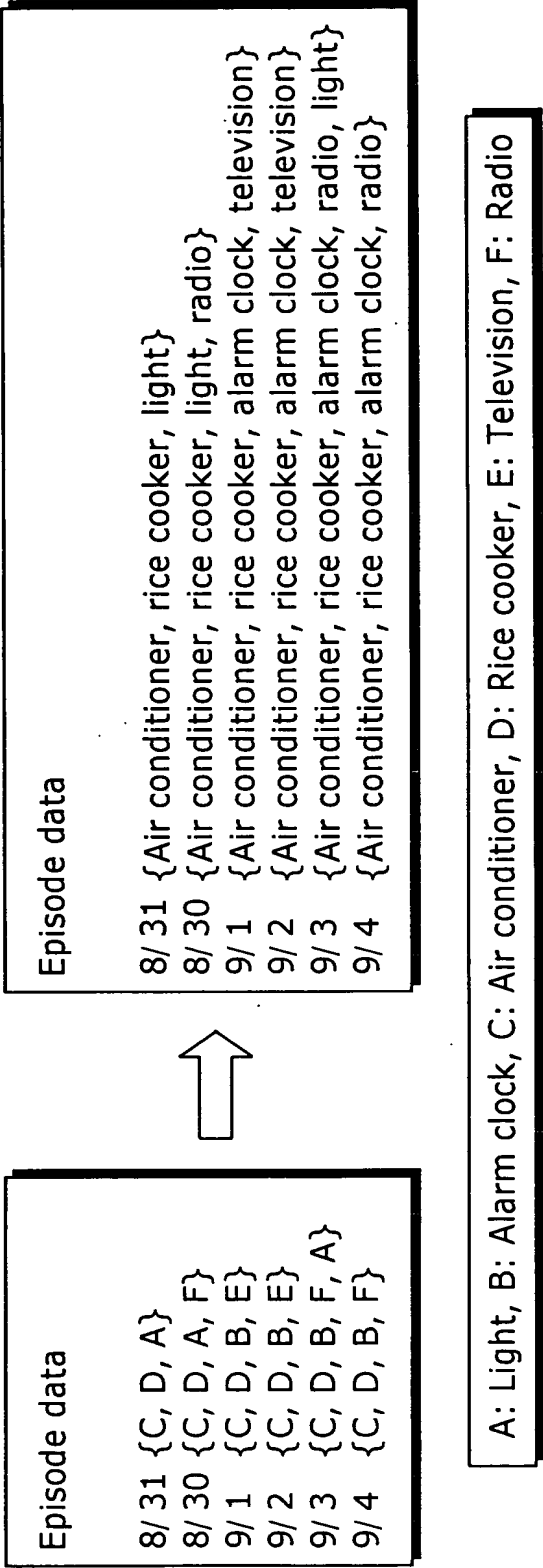


FIG. 38

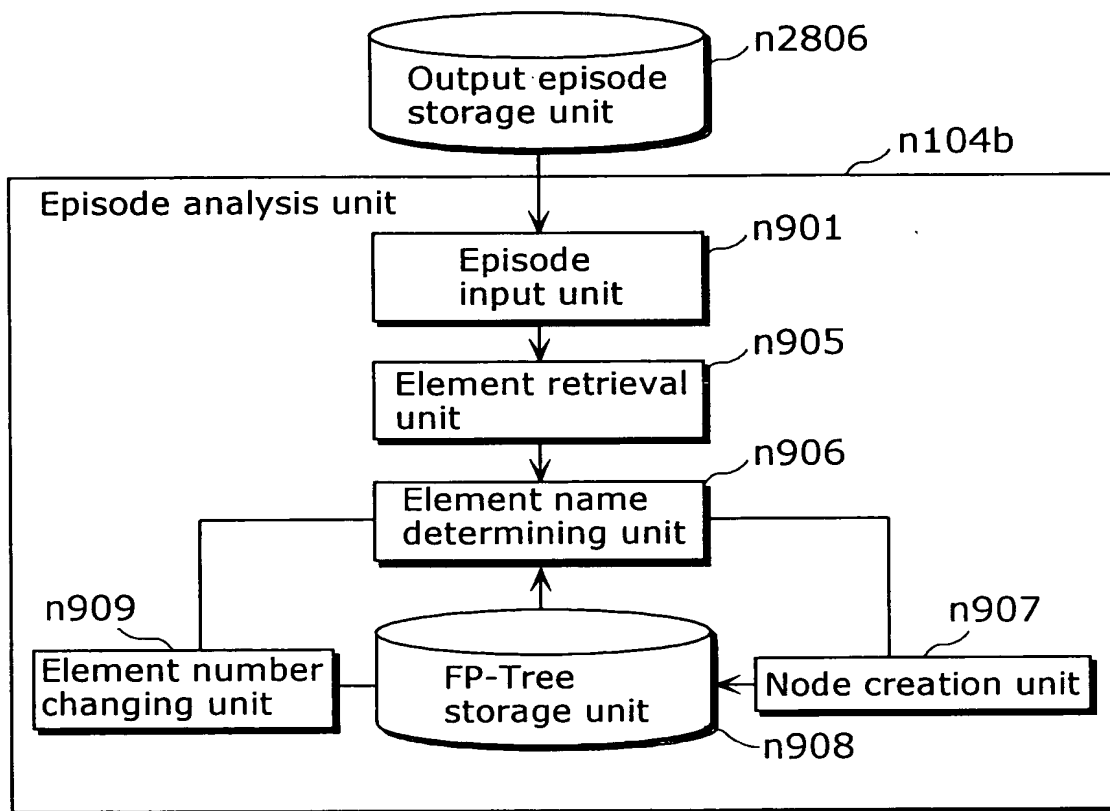


FIG. 39

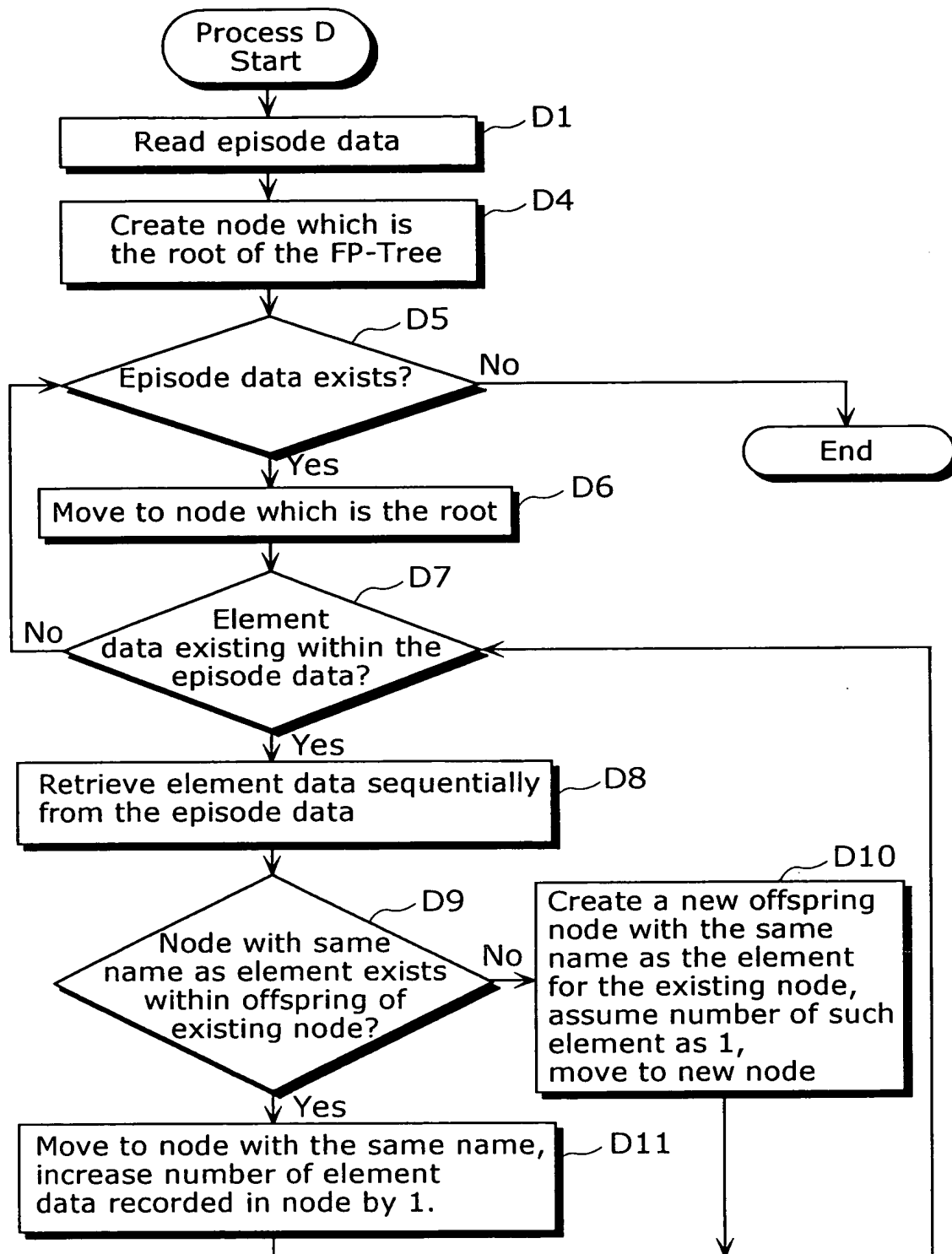


FIG. 40

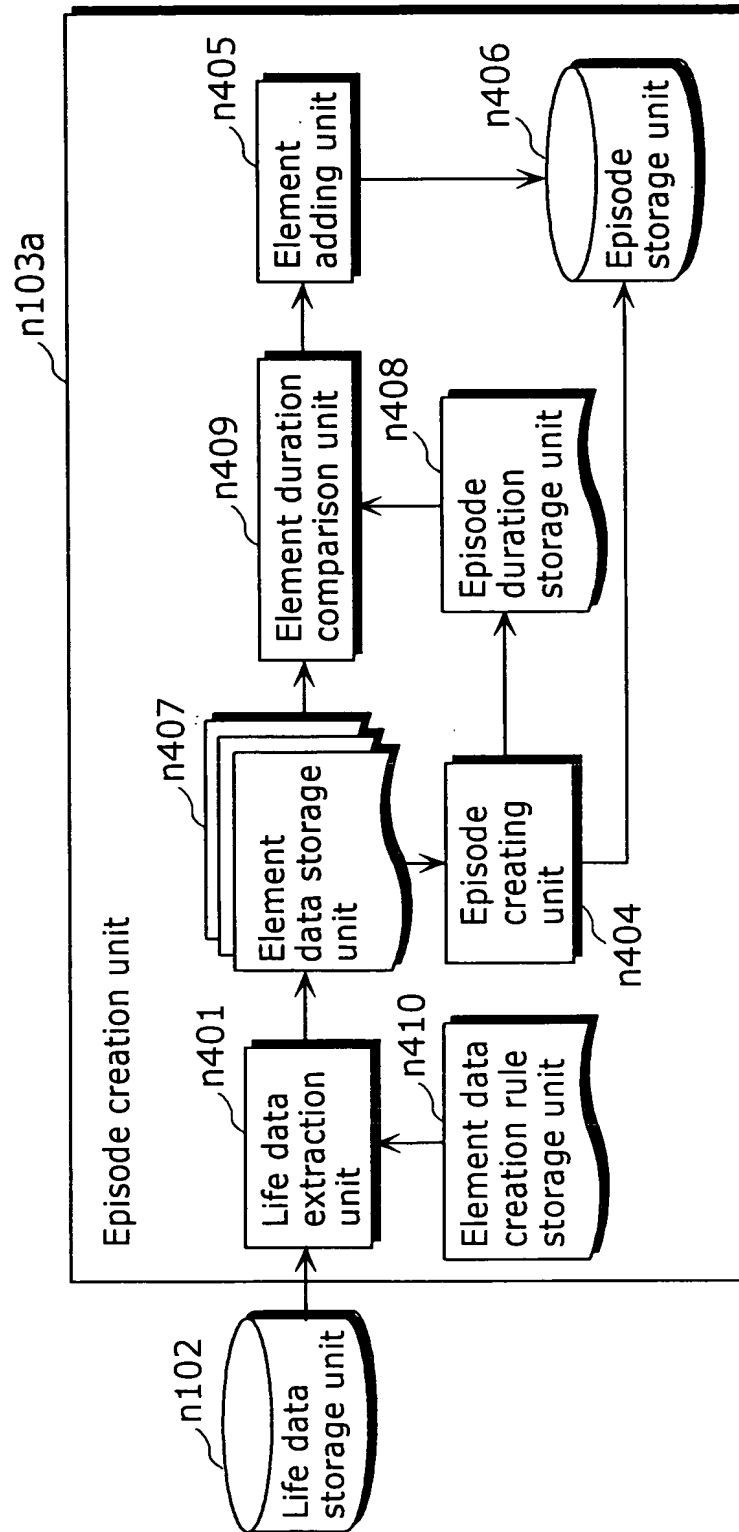




FIG. 41

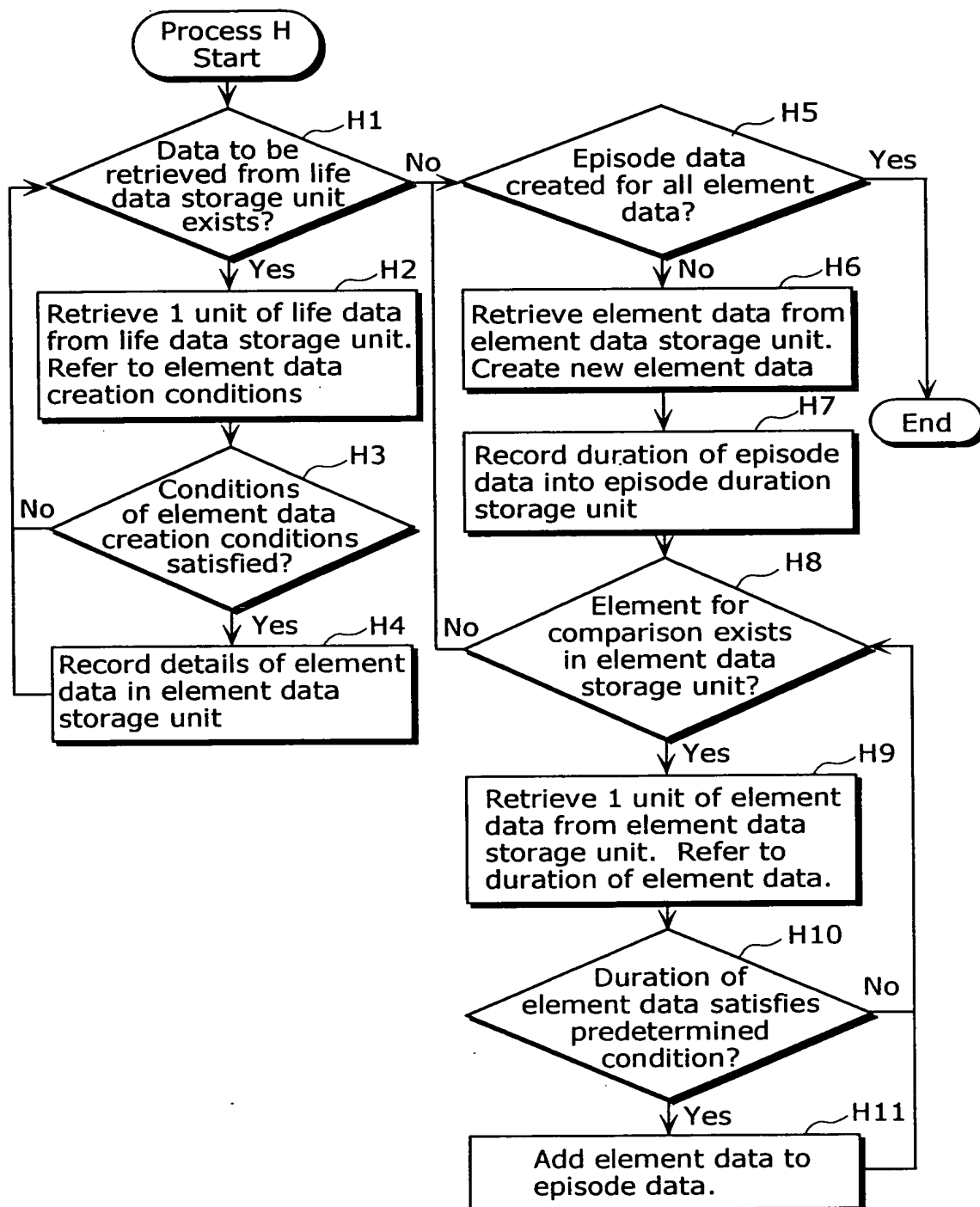


FIG. 42

**Element data creation rules**

---

The group of the following details regarding device use by a user is assumed as element data:

- Device name
- Usage start time
- Usage end time

FIG. 43

Life data

Date and time of operation	Device type	Details of operation	...
2002/08/30 06:11	Television	Power ON	Data 4101
2002/08/30 06:15	Air conditioner	Power ON	Data 4102
2002/08/30 07:00	Cooking range	Power ON	Data 4103
2002/08/30 07:03	Cooking range	Power OFF	Data 4104
2002/08/30 08:30	Air conditioner	Power OFF	Data 4105
2002/08/30 08:31	Television	Power OFF	Data 4106
2002/08/30 08:45	Light	Power OFF	
:	:	:	
2002/08/31 06:45	Television	Channel 2	
2002/08/31 06:45	PC	Power ON	
2002/08/31 07:00	Television	Volume UP	
2002/08/31 07:05	Television	Channel 8	
2002/08/31 08:00	Television	Power OFF	
:	:	:	

FIG. 44

Element data

Element ID	Device name	Start time	End time
1	Television	6:11	8:31
2	Air conditioner	6:15	8:30
3	Cooking range	7:00	7:03
	Light		6:45
.	.	.	.
.	.	.	.
.	.	.	.
	PC	6:45	

FIG. 45

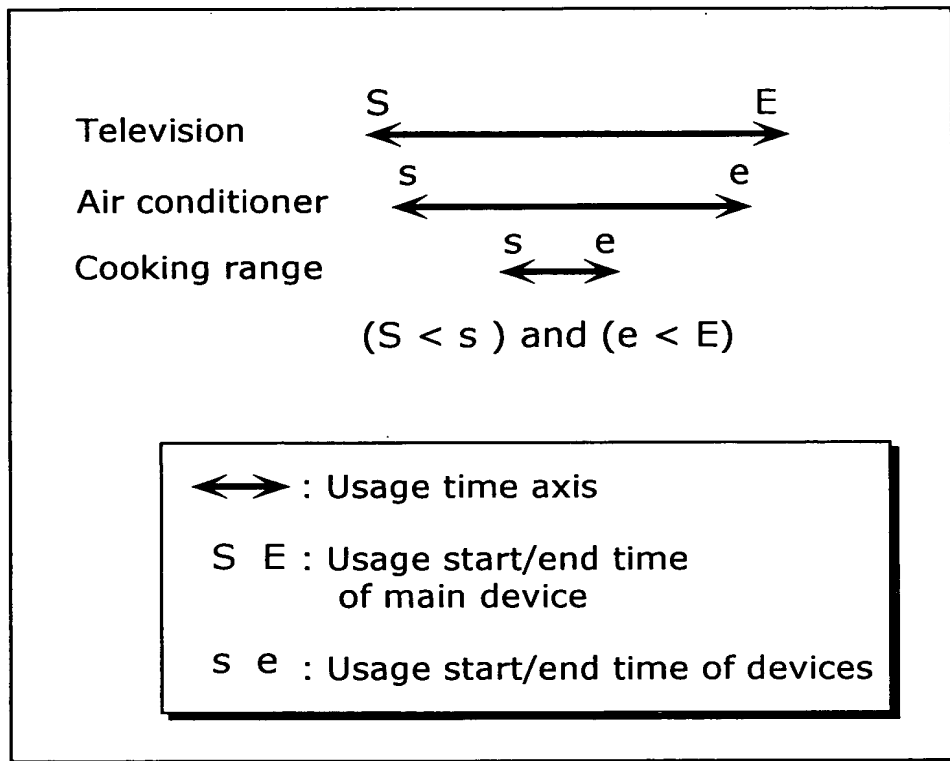


FIG. 46

<div>Episode data regarding use of television</div> <div>{television, air conditioner, cooking range}</div>	<div>Episode data regarding use of air conditioner</div> <div>{air conditioner, cooking range}</div> <div>.</div> <div>.</div> <div>.</div>
---	---

FIG. 47

**Element data creation rules**

---

The group of the following details regarding content or device use by a user is assumed as element data:

- Content or device name
- Usage start time
- Usage end time

FIG. 48

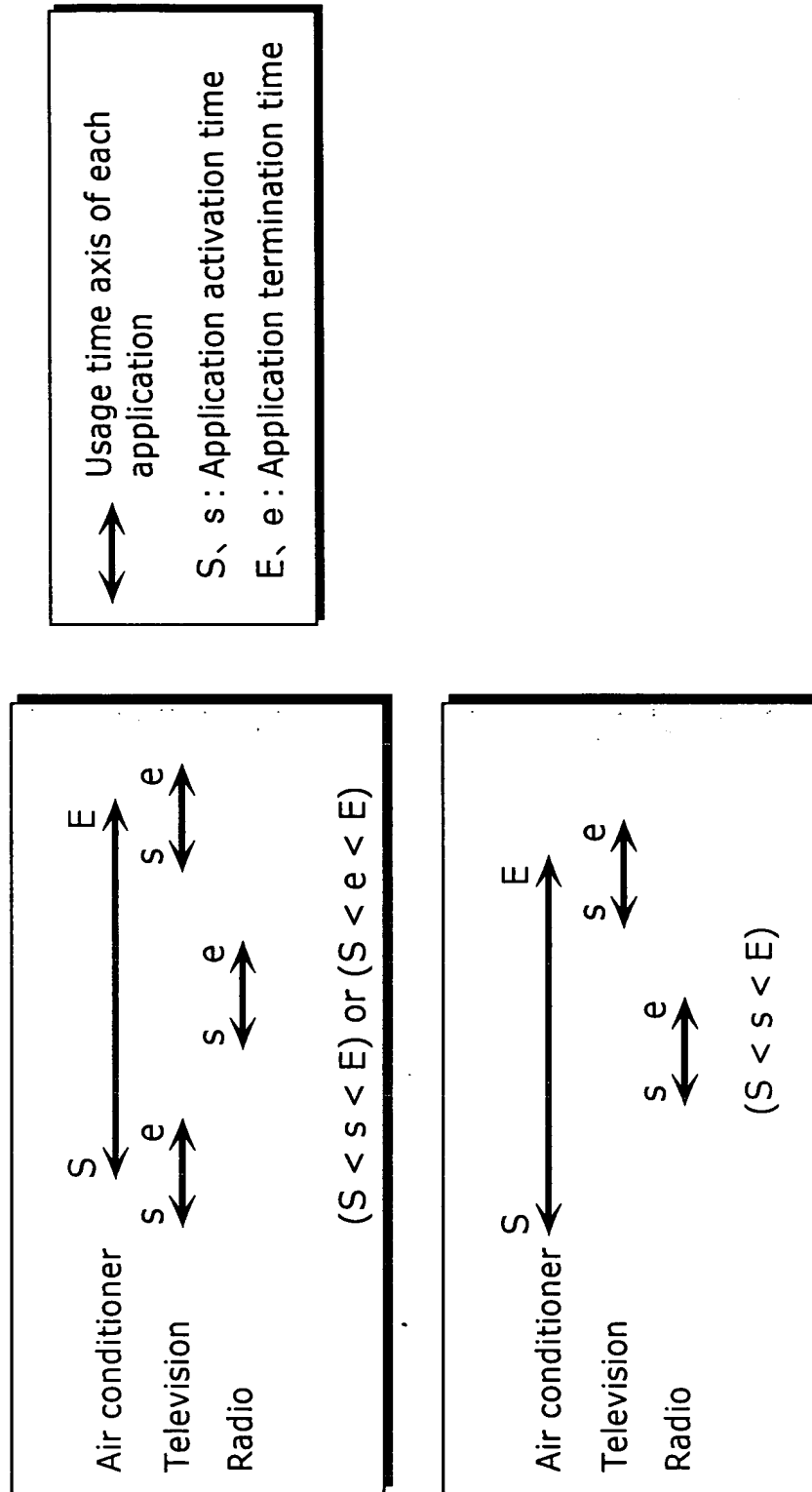




FIG. 49

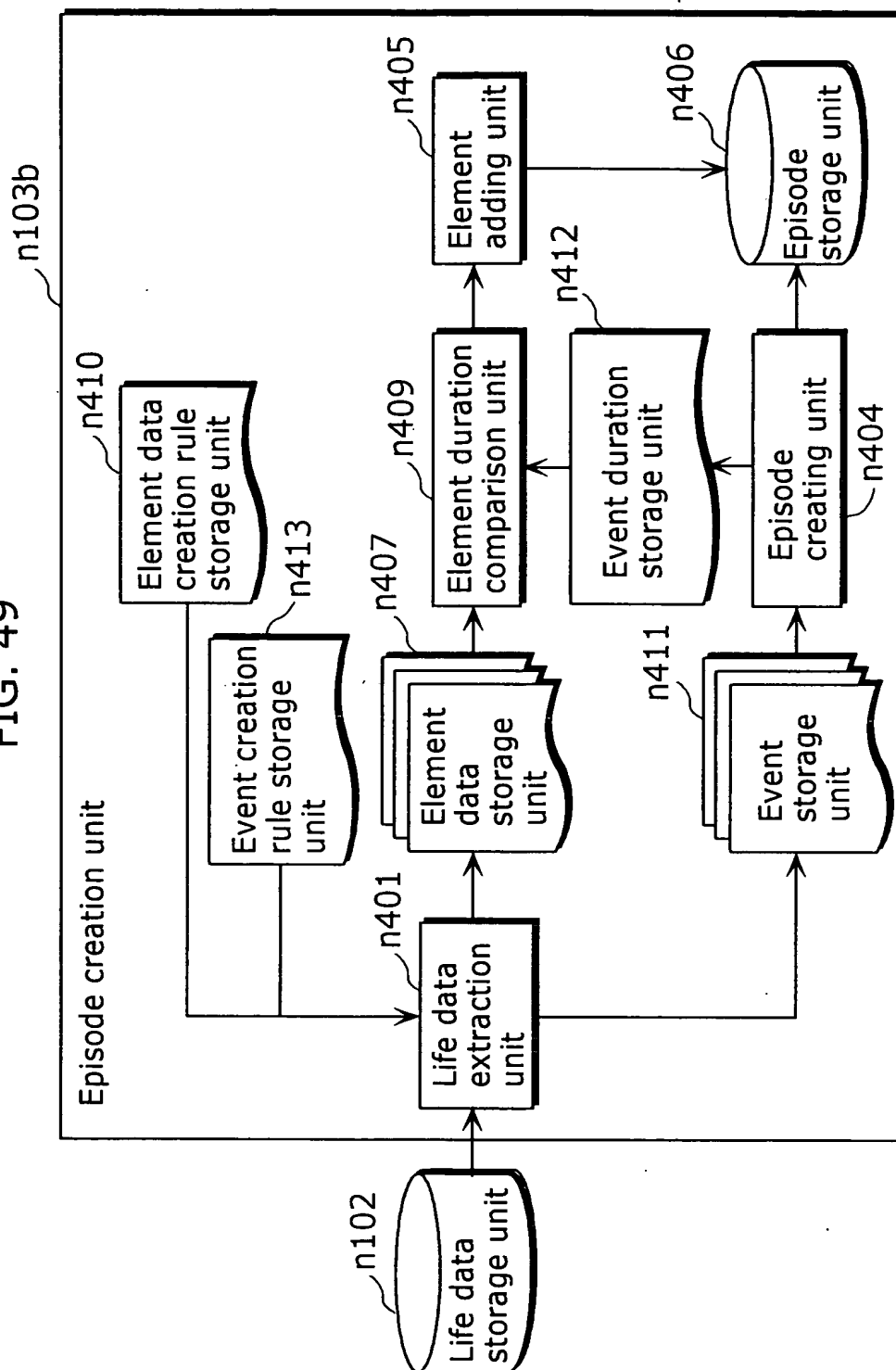


FIG. 50

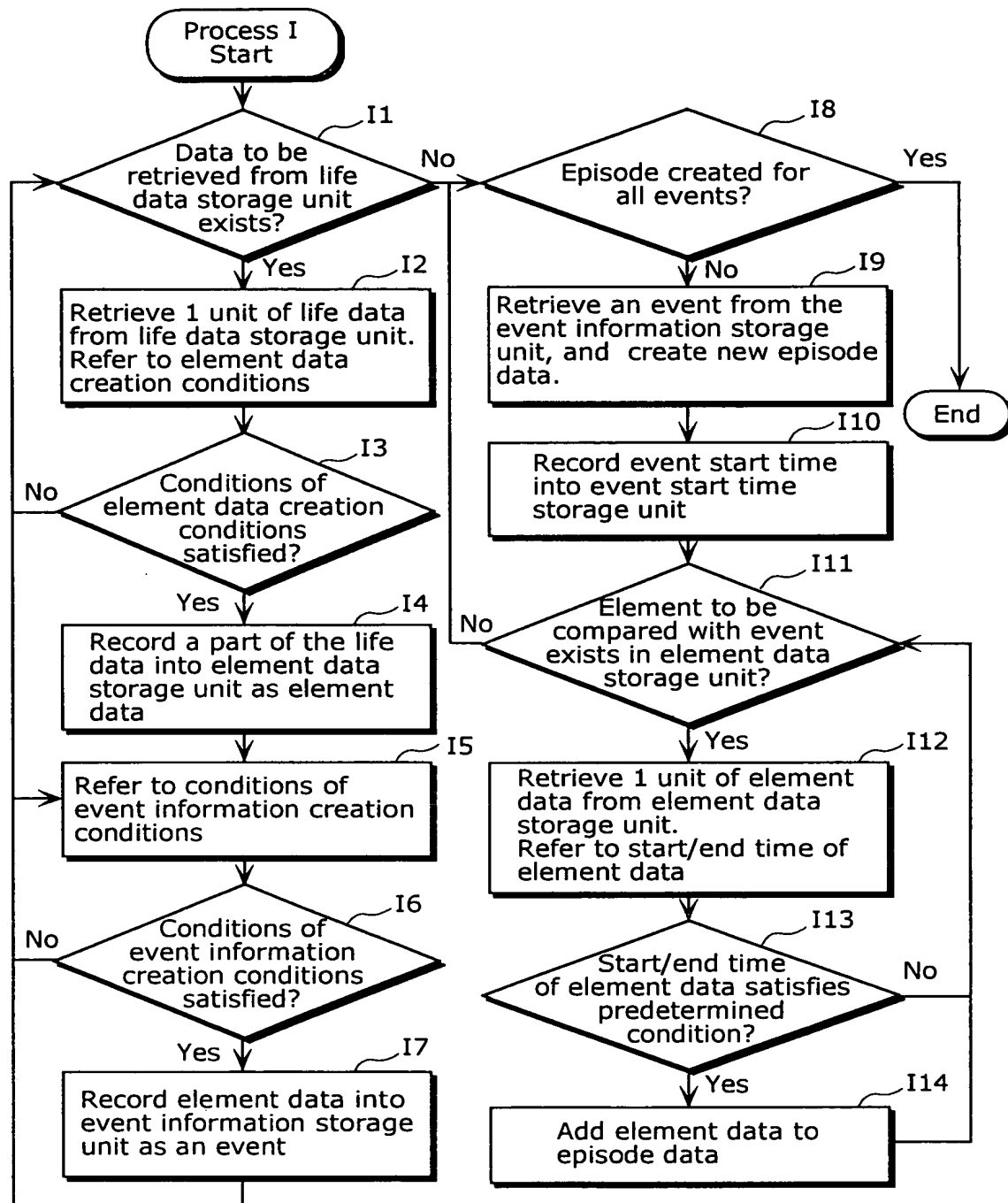


FIG. 51

Event creation rules

■ Details of Event

Turning-ON the power of a random device

■ Duration of event

5 minutes, starting from turning-ON of power

FIG. 52

Event data

Element ID	Device name	Event details	Event duration
1	Television	Power ON	6:11–6:16
2	Air conditioner	Power ON	6:15–6:20
3	Cooking range	Power ON	7:00–7:05
	Light		
⋮	⋮	⋮	⋮
	PC	Power ON	6:45–6:50

FIG. 53

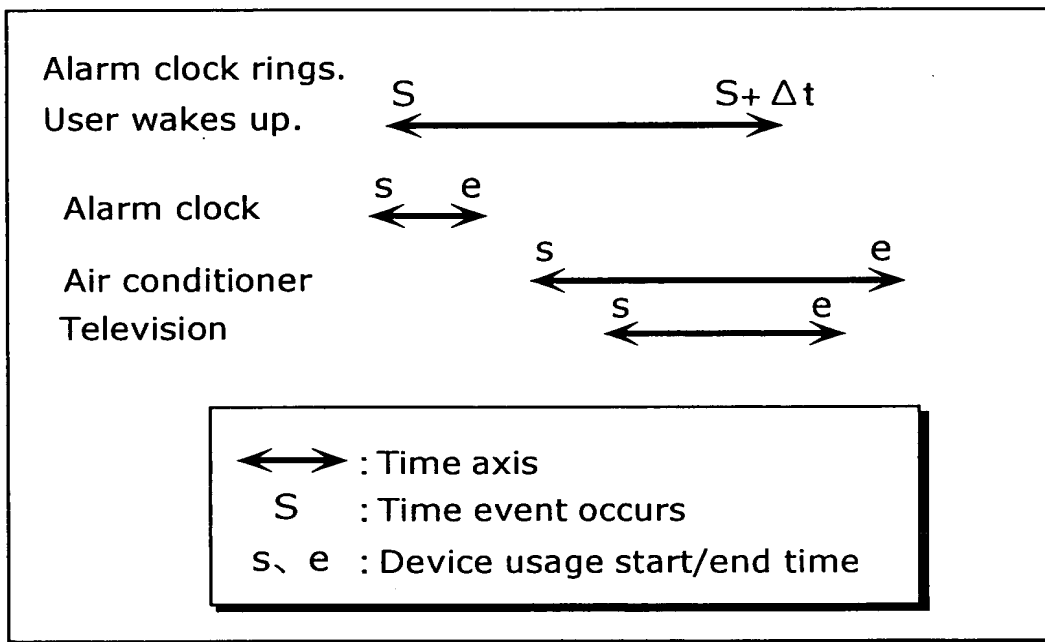
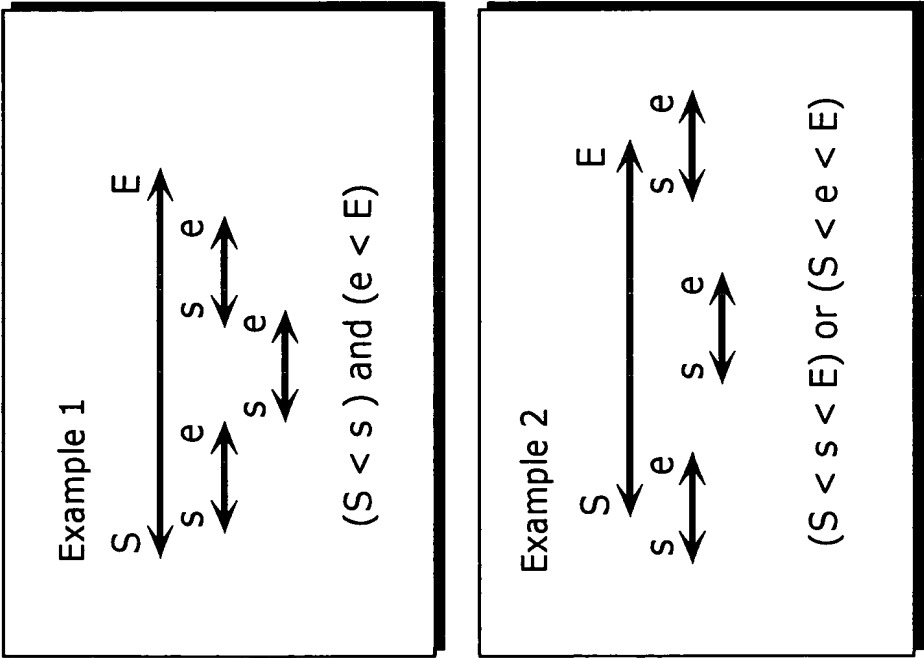


FIG. 54

<u>Episode data</u>
Television turning-ON {Air conditioner}

FIG. 55



Usage time axis for each application

S、s : Application activation time

E、e : Application termination time

FIG. 56

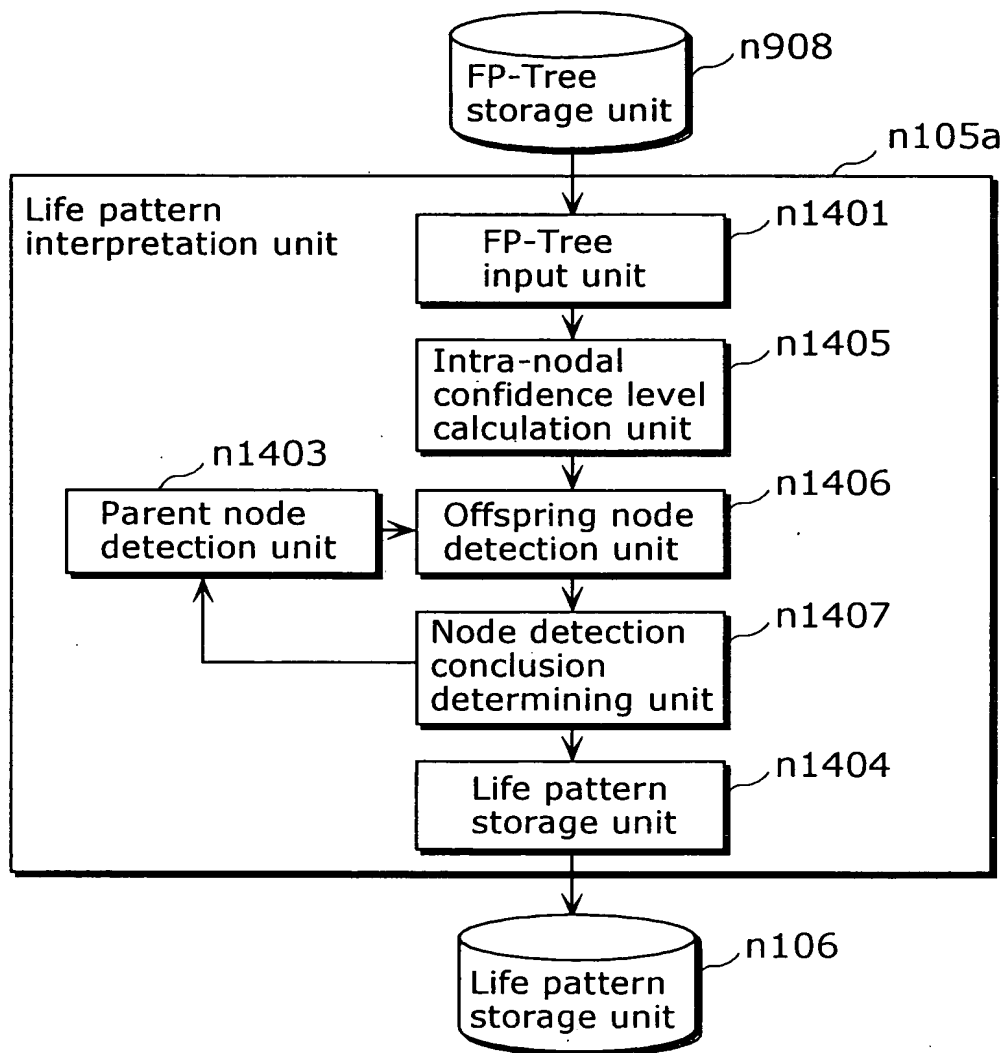
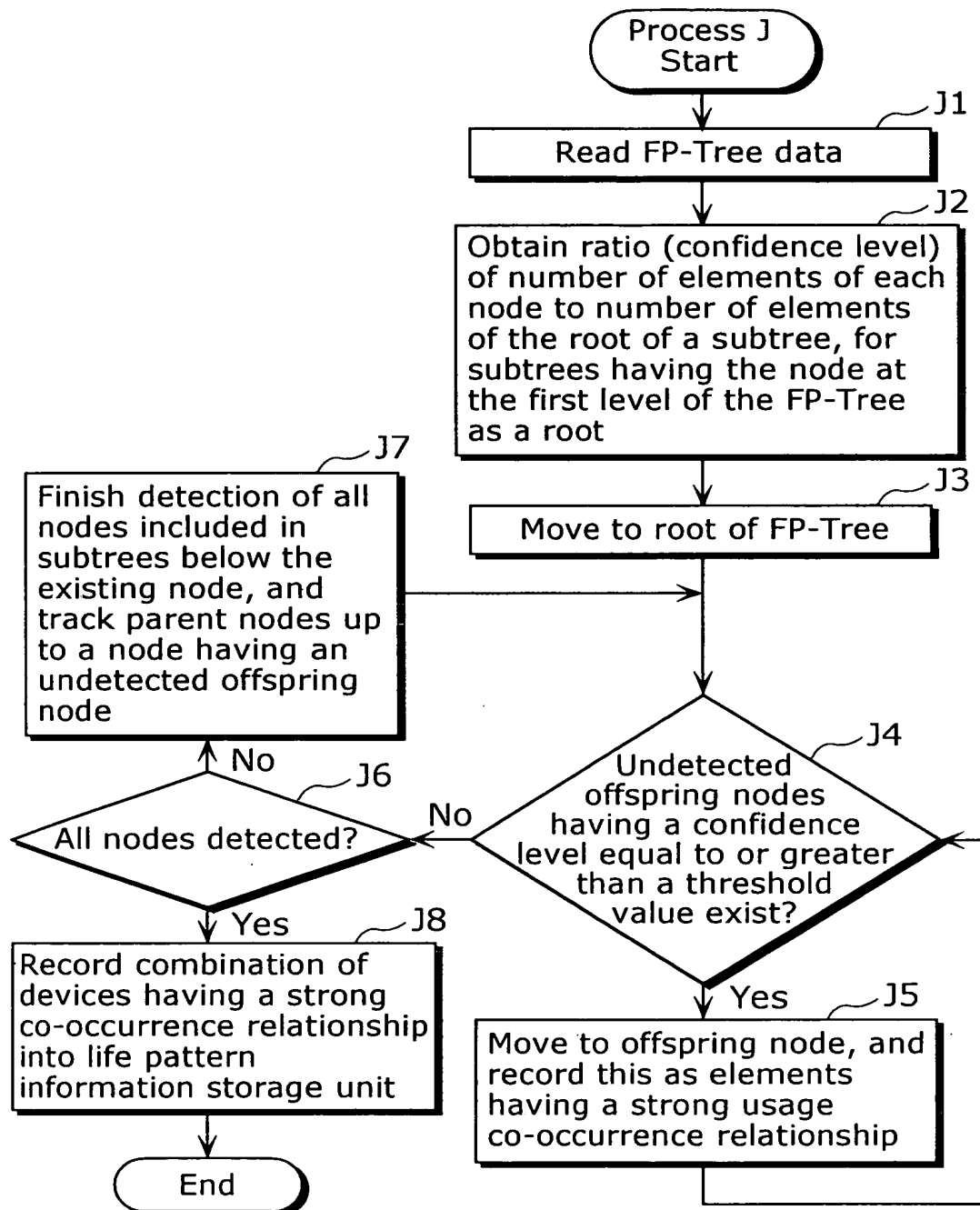
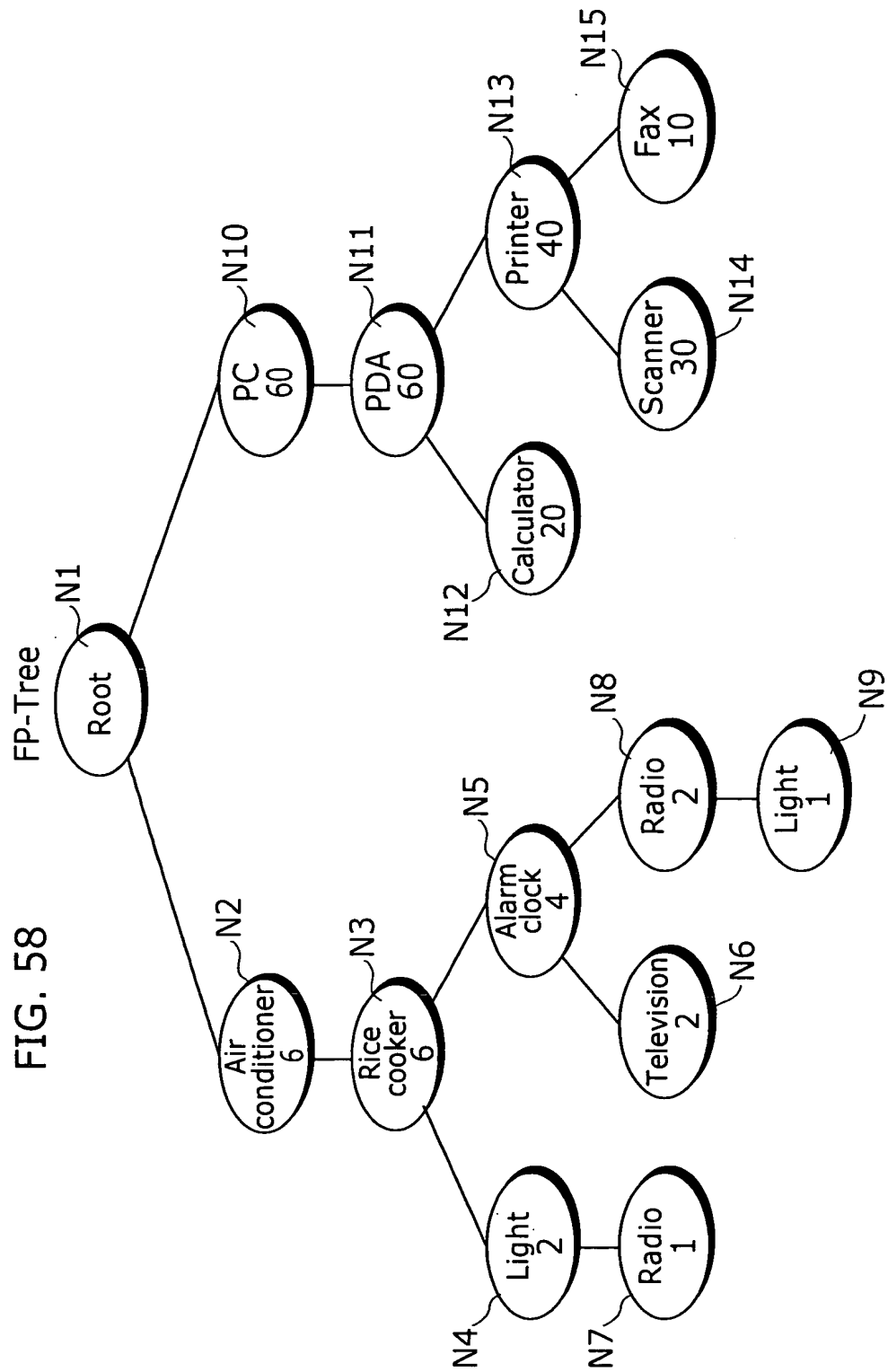
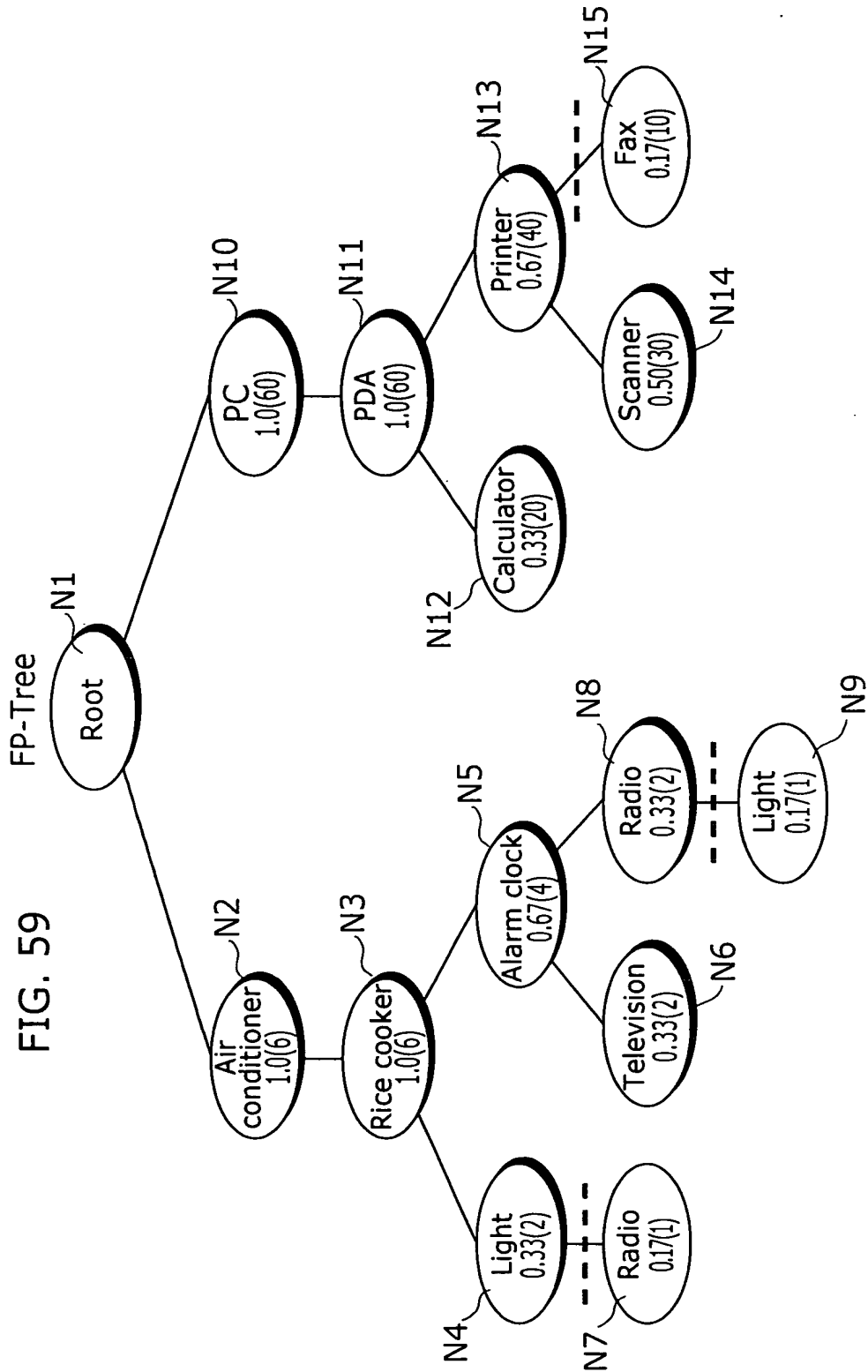




FIG. 57







## Life pattern information

FIG. 60A

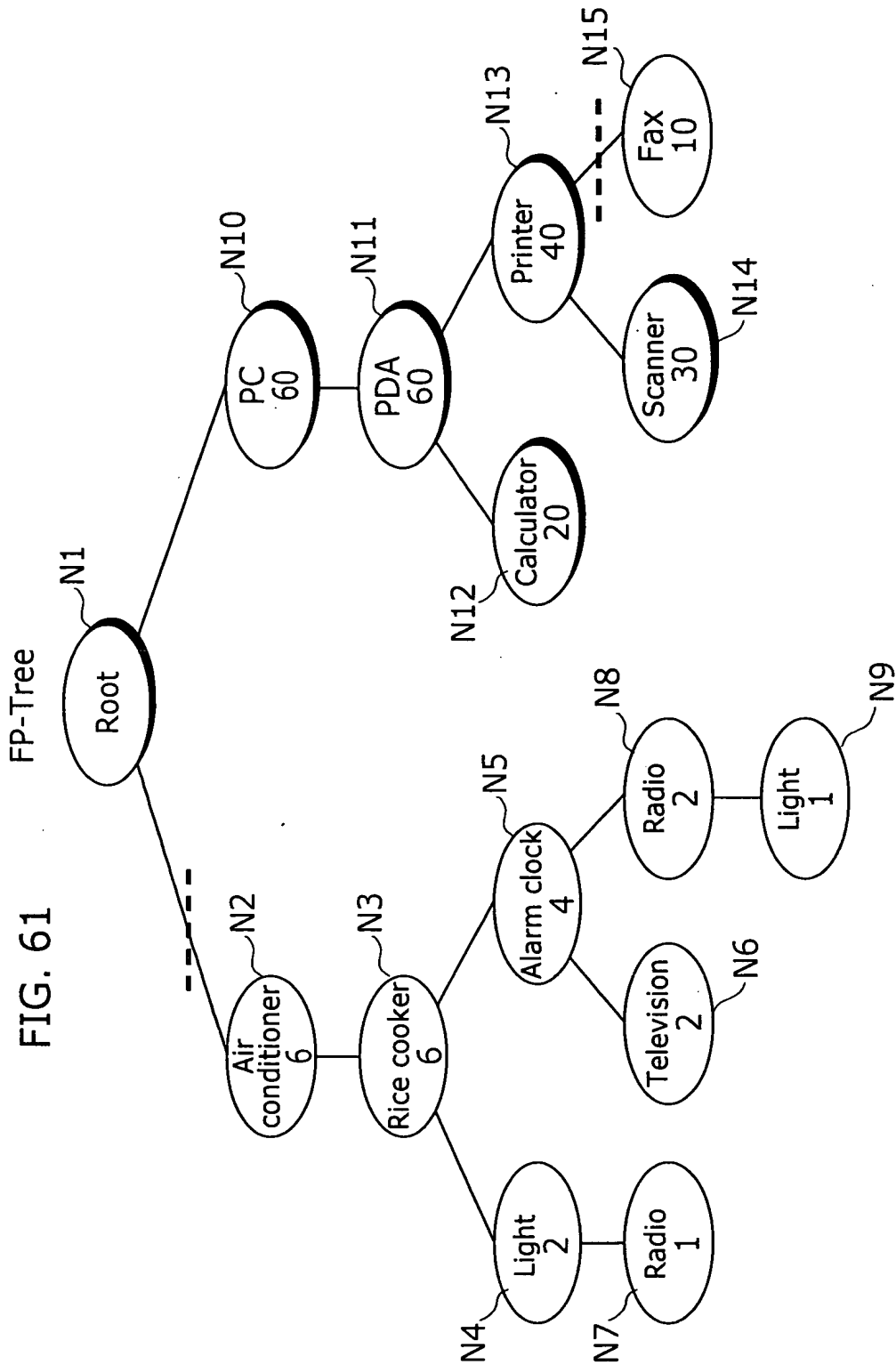
Devices with confidence level equal to or greater than 0.30, with respect to the air conditioner

- {Rice cooker, light}
- {Rice cooker, alarm clock, television}
- {Rice cooker, alarm clock, radio}

FIG. 60B

Devices with confidence level equal to or greater than 0.30, with respect to the PC

- {PDA, calculator}
- {PDA, printer, scanner}





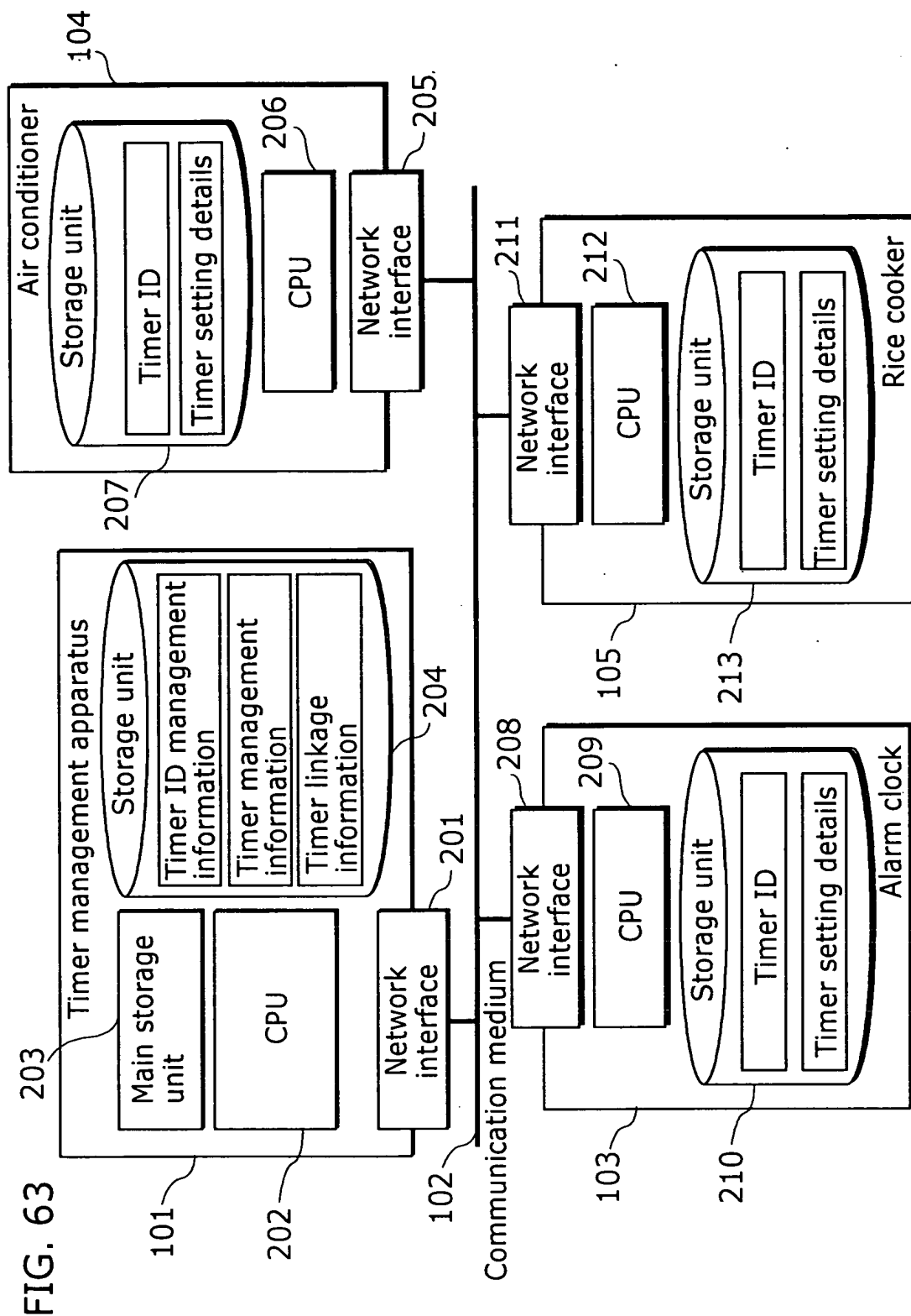
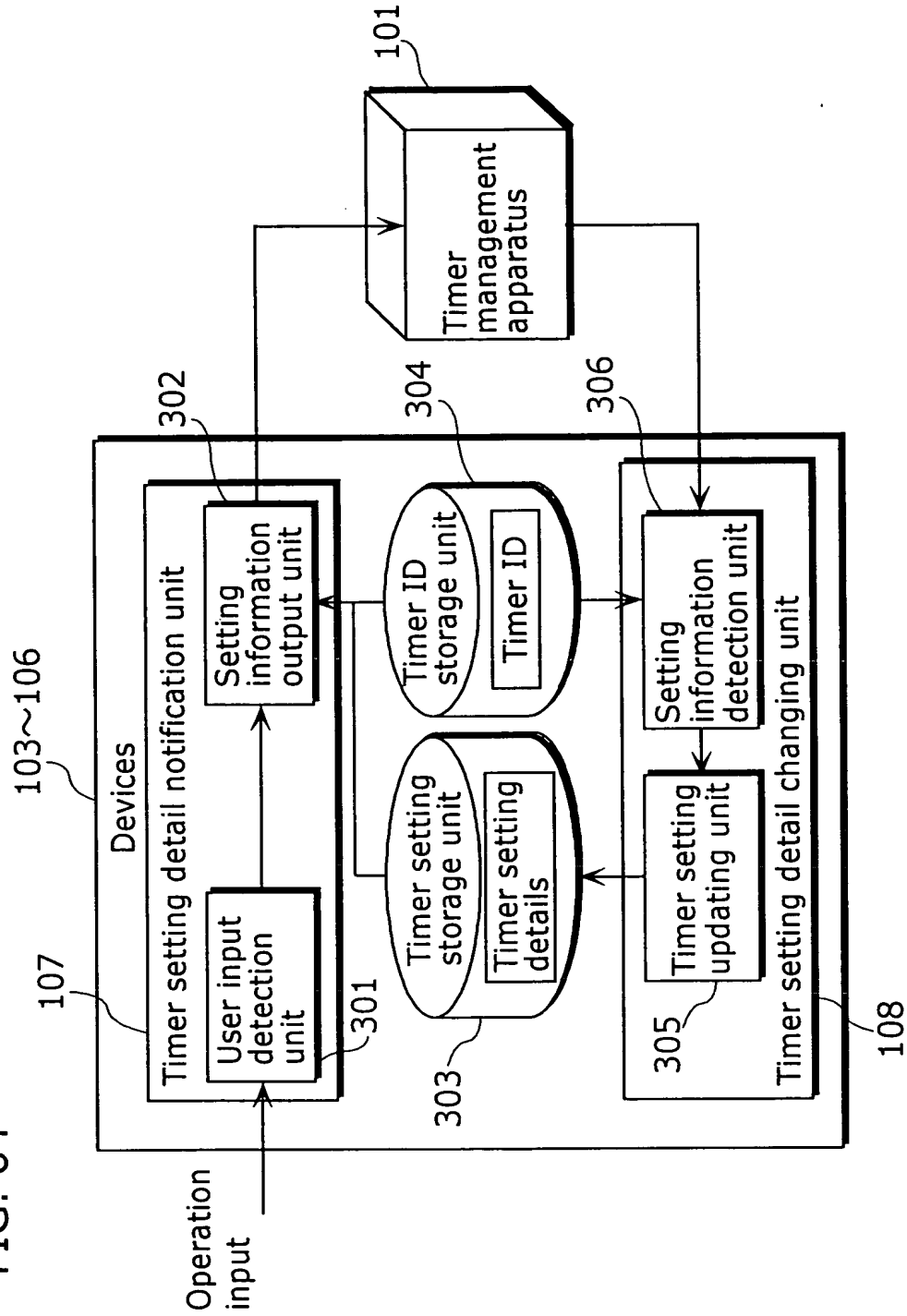
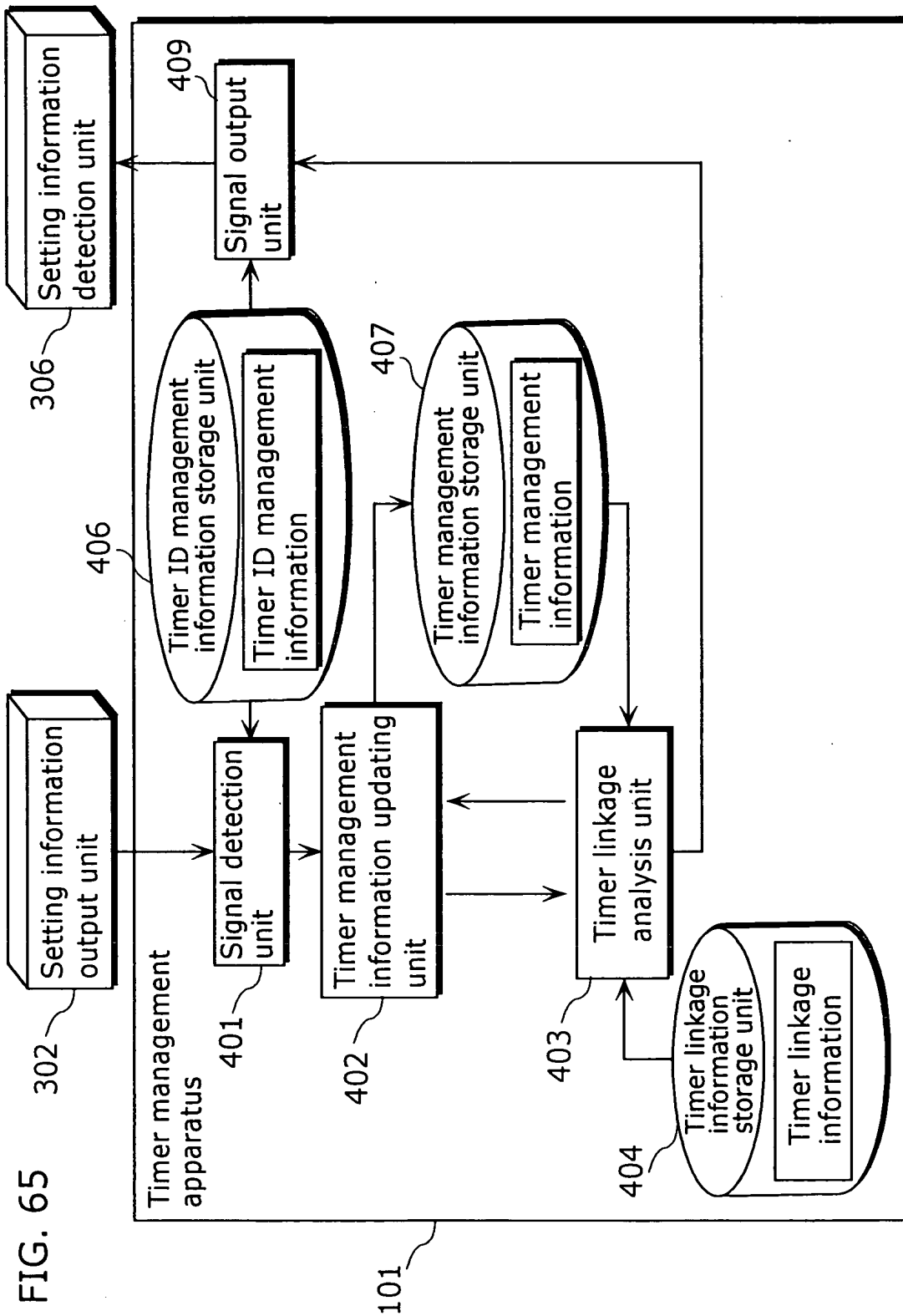


FIG. 64







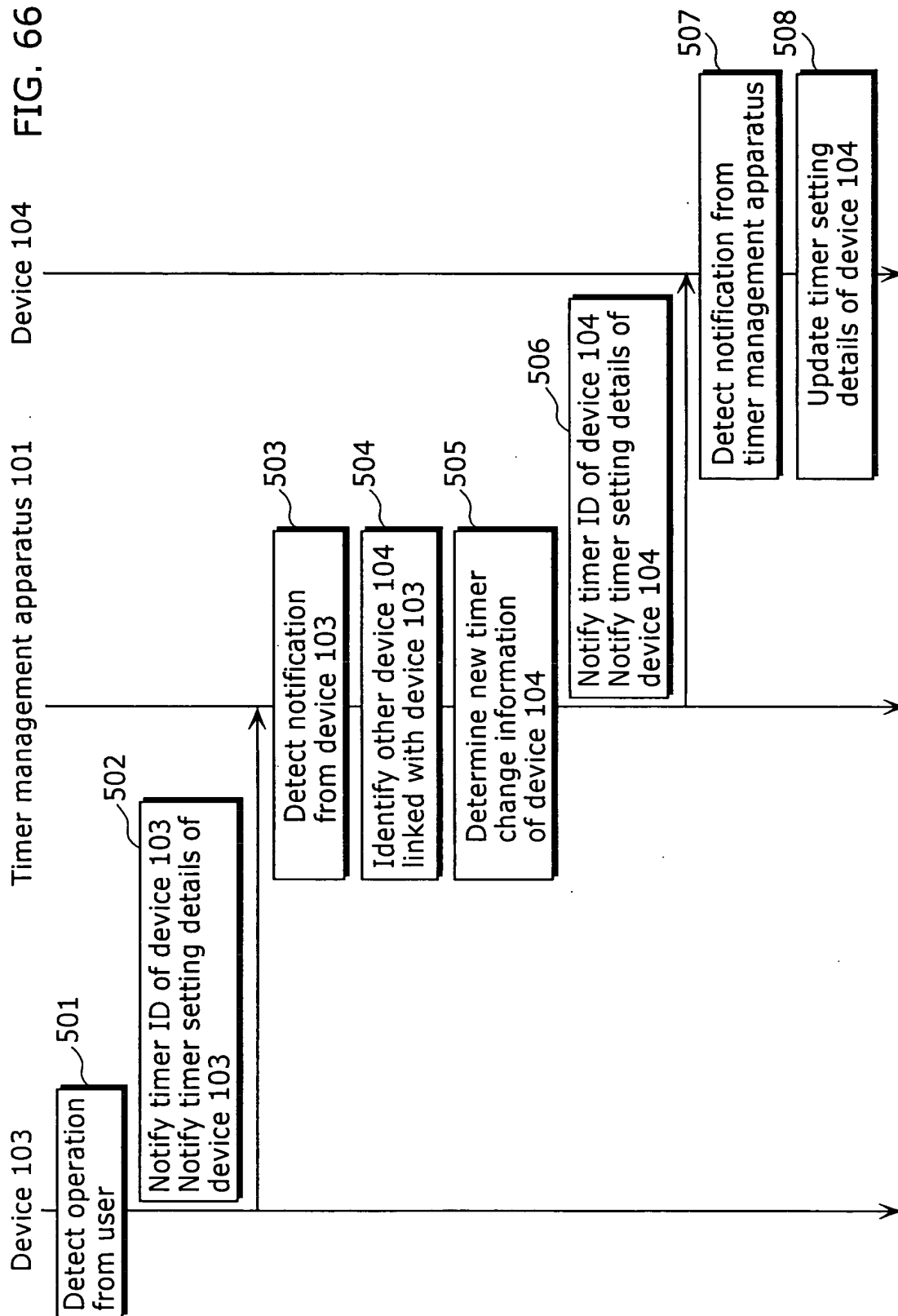


FIG. 67

Timer linkage information

Linked timer ID		001	002	003	004	005
Timer ID		Air conditioner	Alarm clock	Rice cooker	Television	
001	Air conditioner	0	30min	60min		
002	Alarm clock	-30min	0	30min		
003	Rice cooker	-60min	-30min	0		
004	Television				0	
005						

Key timer ID

FIG. 68A

Timer management information

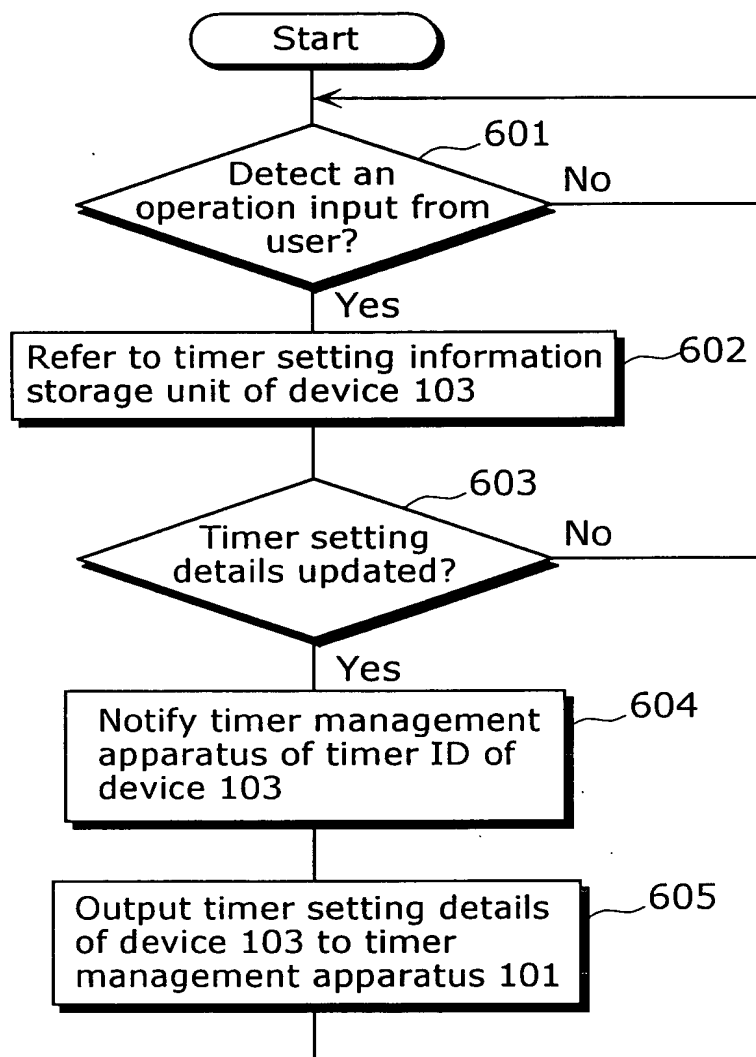
Timer ID	Date	Time	Name	Details of operation
001	02/01/15	06:30:00	Air conditioner	Power ON
002	02/01/15	07:00:00	Alarm clock	Alarm start-up
003	02/01/15	07:30:00	Rice cooker	End cooking
004	02/01/15	07:30:00	Television	Power ON
005				

FIG. 68B

Timer management information

Timer ID	Date	Time	Name	Details of operation
001	02/01/15	06:30:00	Air conditioner	Power ON
002	02/01/15	06:00:00	Alarm clock	Alarm start-up
003	02/01/15	07:30:00	Rice cooker	End cooking
004	02/01/15	07:30:00	Television	Power ON
005				

FIG. 69



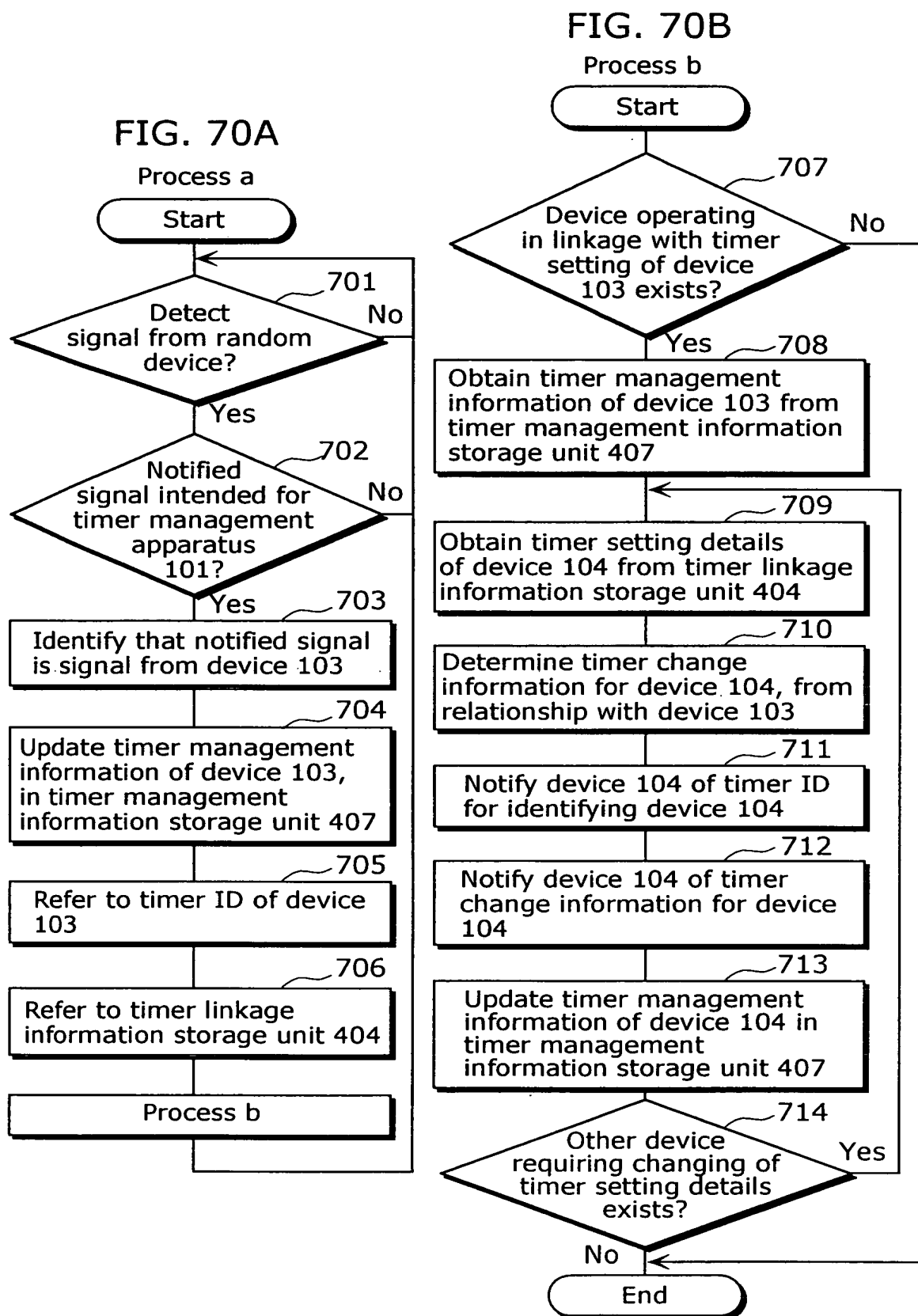


FIG. 71

Timer management information

Timer ID	Date	Time	Name	Details of operation
001	02/01/15	05:30:00	Air conditioner	Power ON
002	02/01/15	06:00:00	Alarm clock	Alarm start-up
003	02/01/15	06:30:00	Rice cooker	End cooking
004	02/01/15	07:30:00	Television	Power ON
005				

FIG. 72

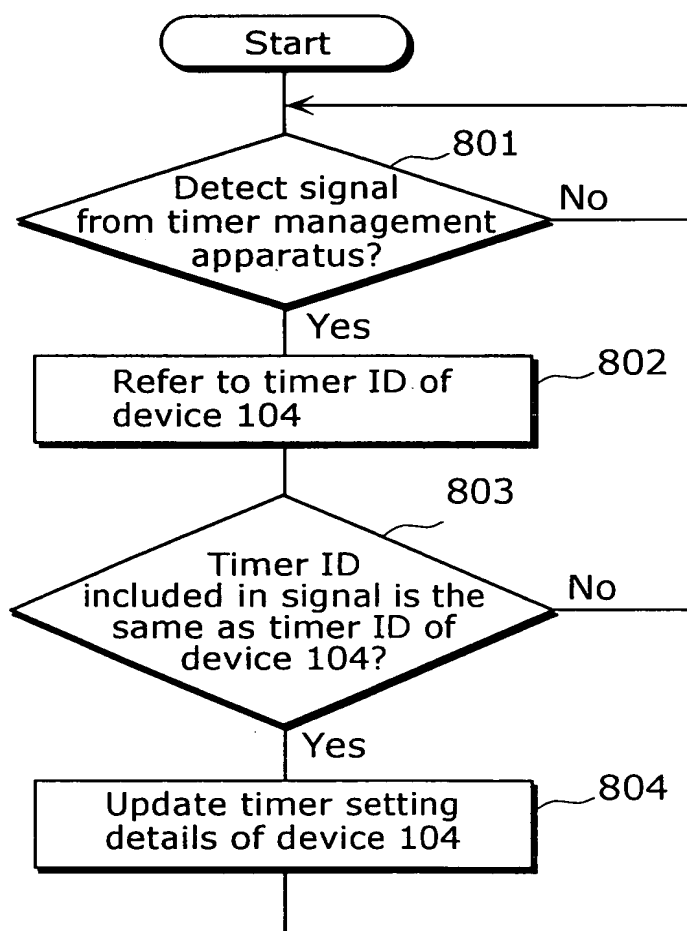
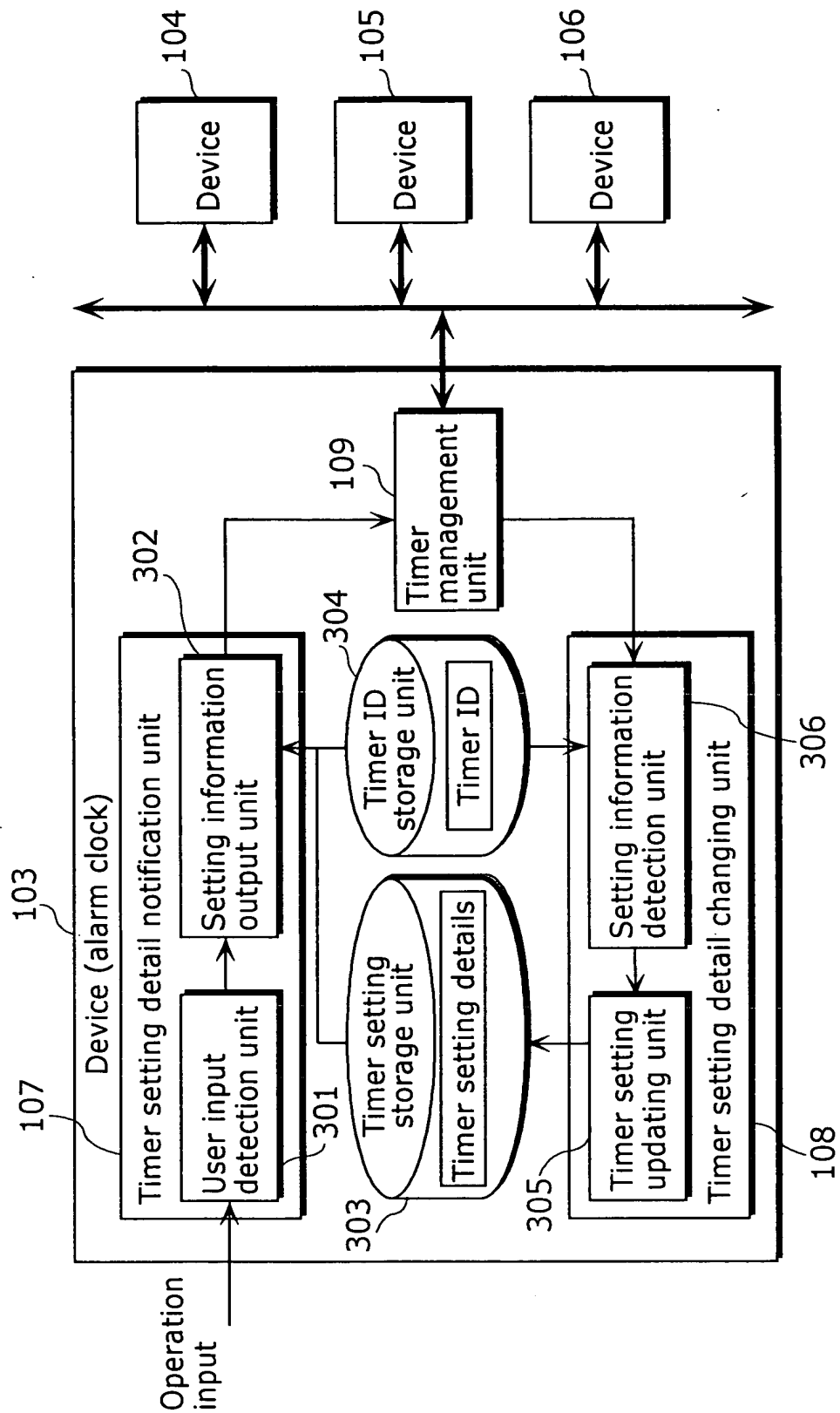




FIG. 73



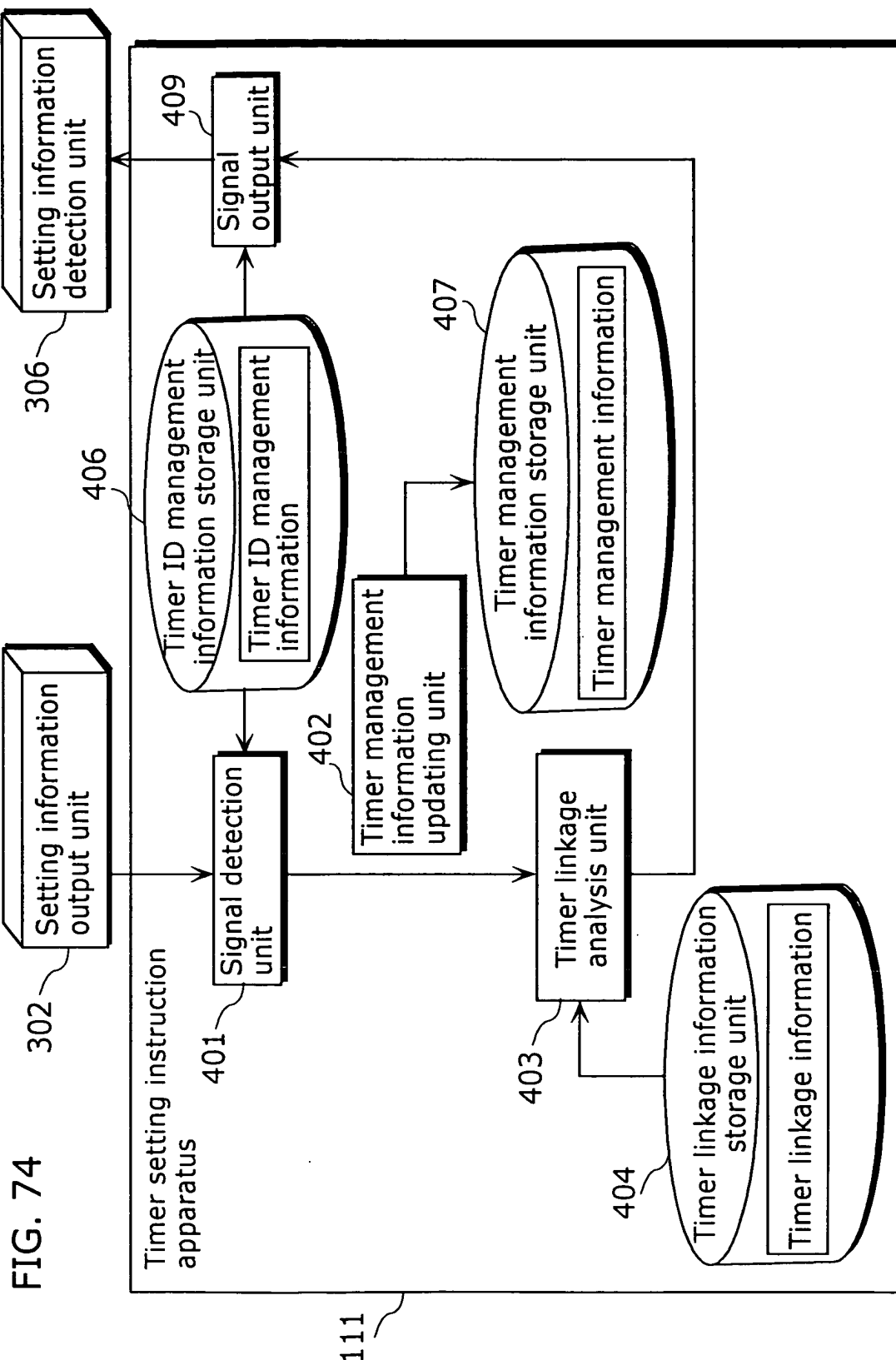


FIG. 75A

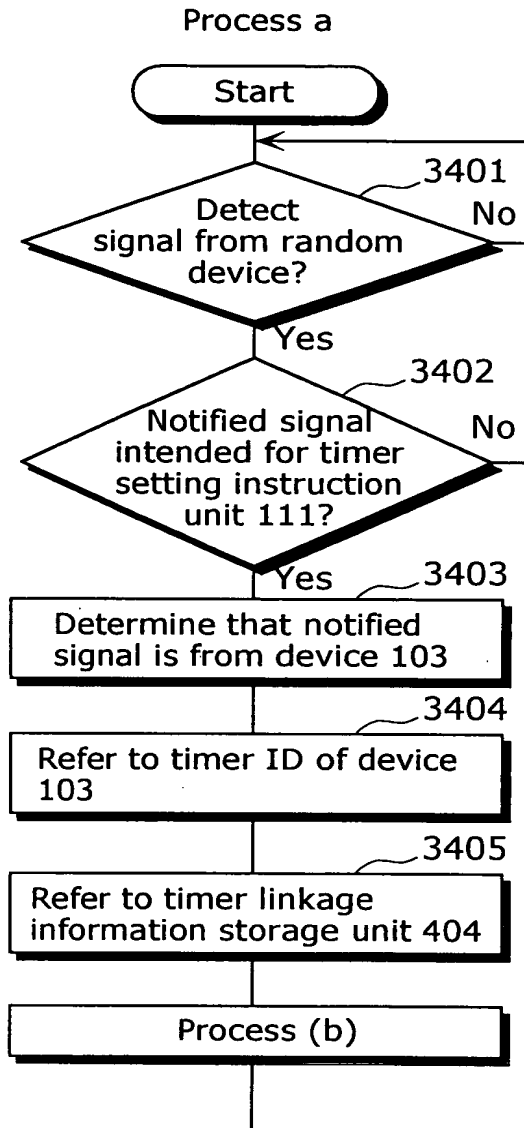
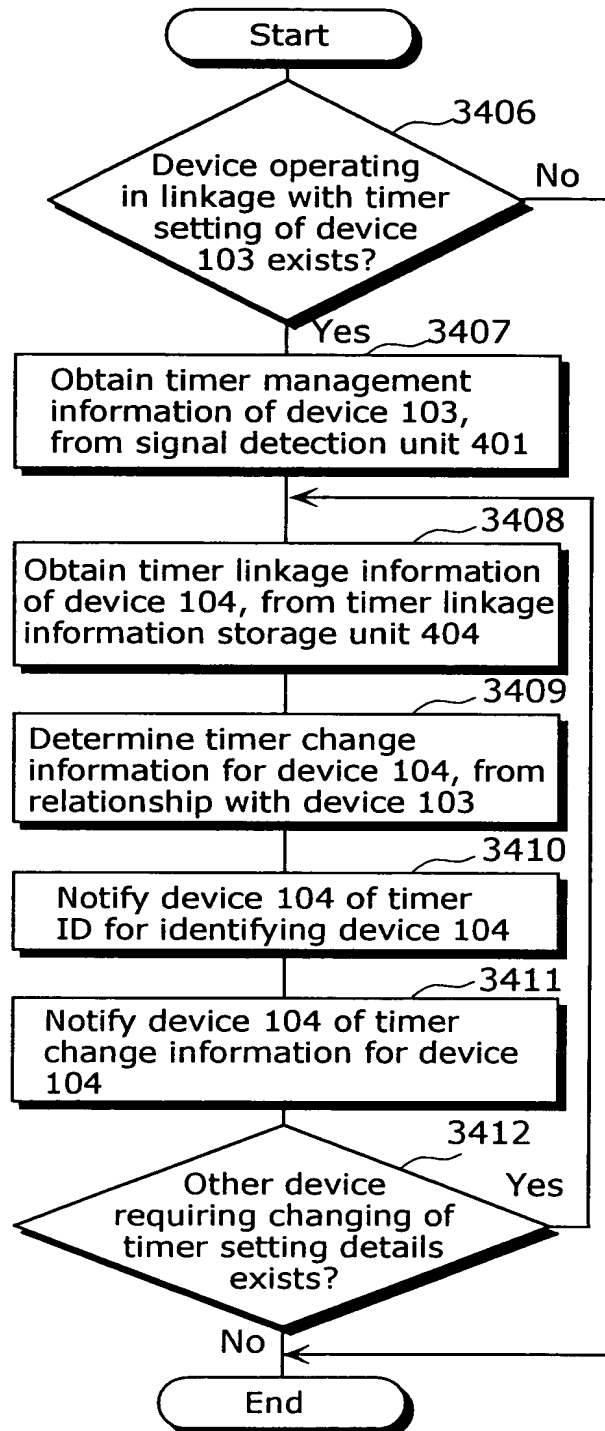
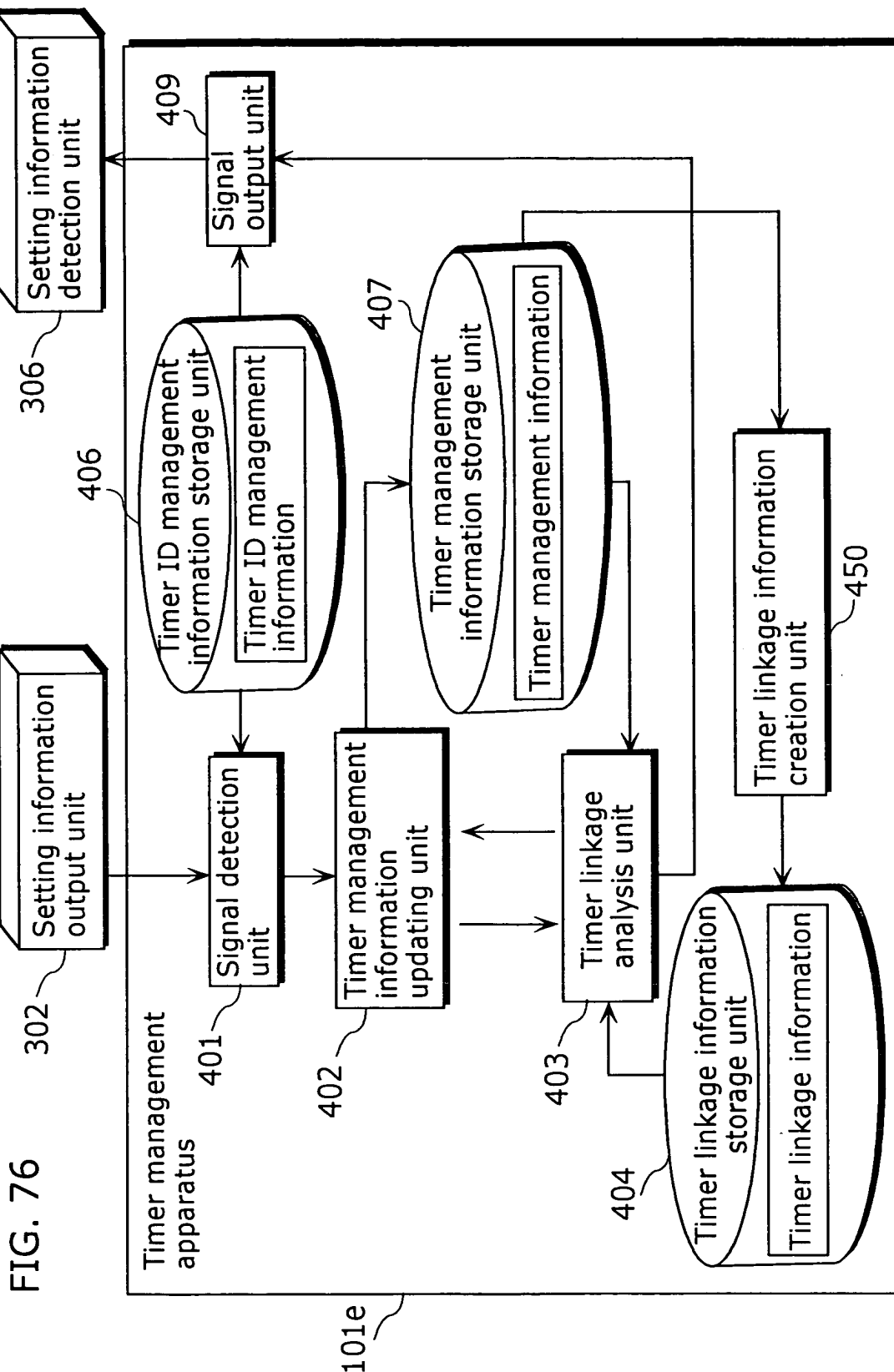


FIG. 75B

Process b





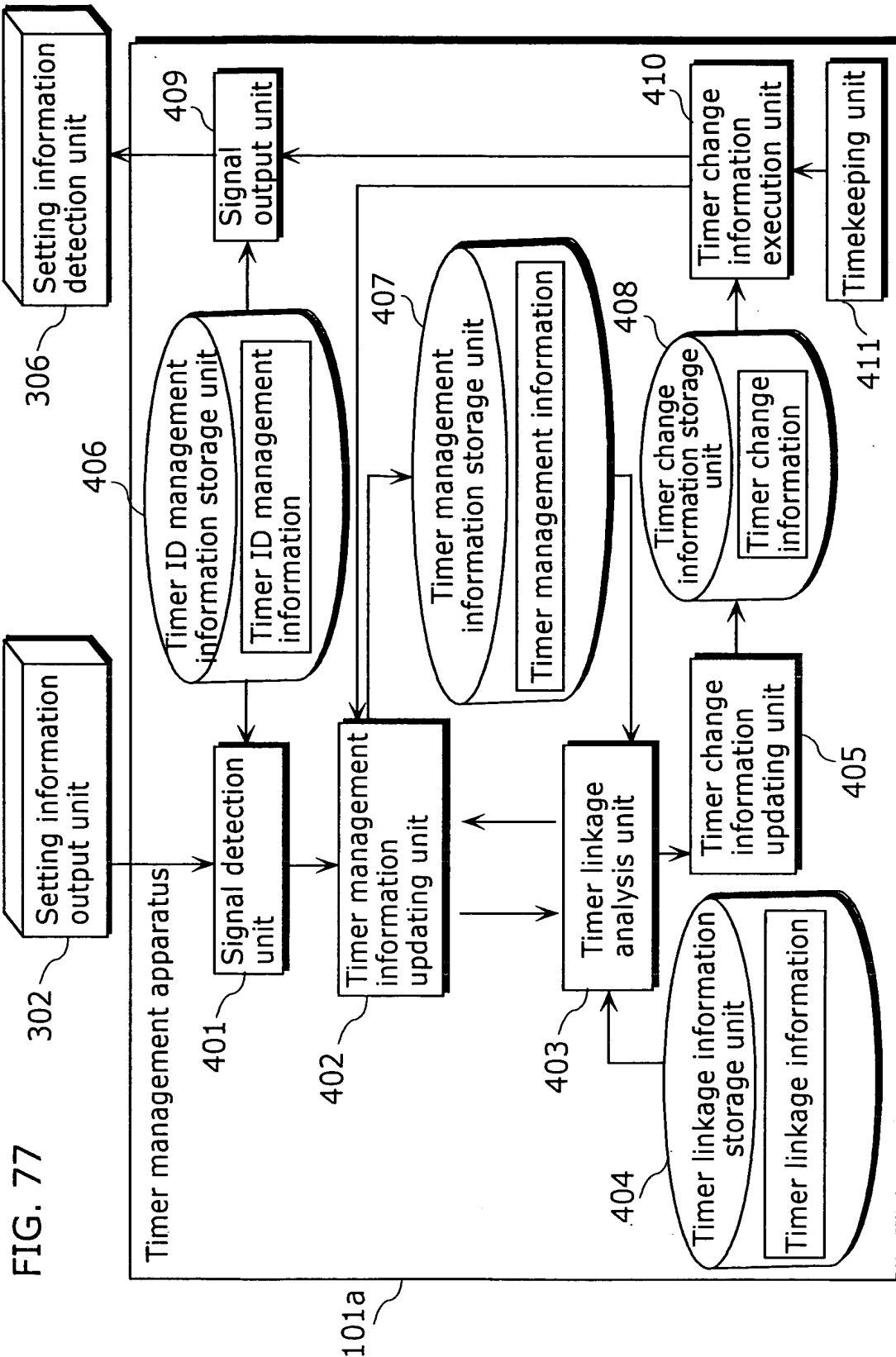


FIG. 78A

Process a

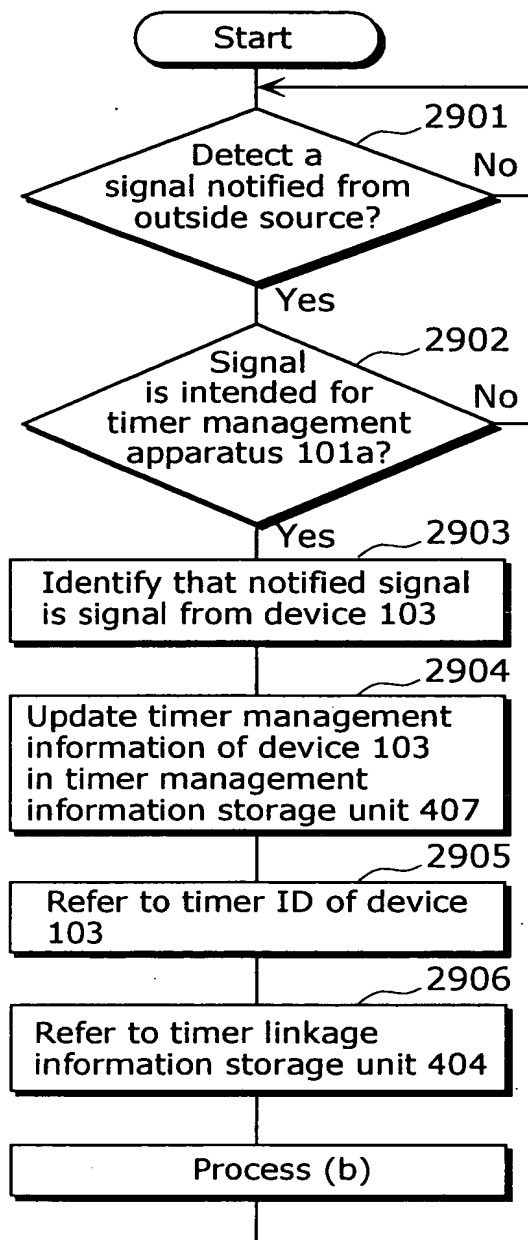


FIG. 78B

Process b

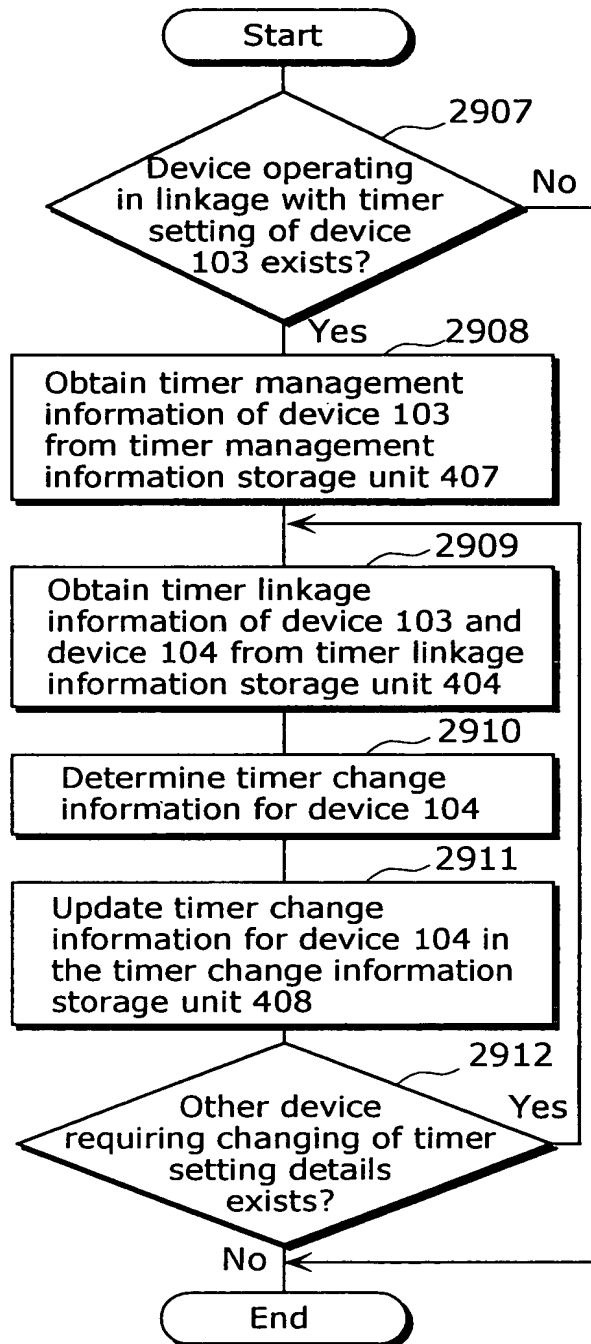


FIG. 79

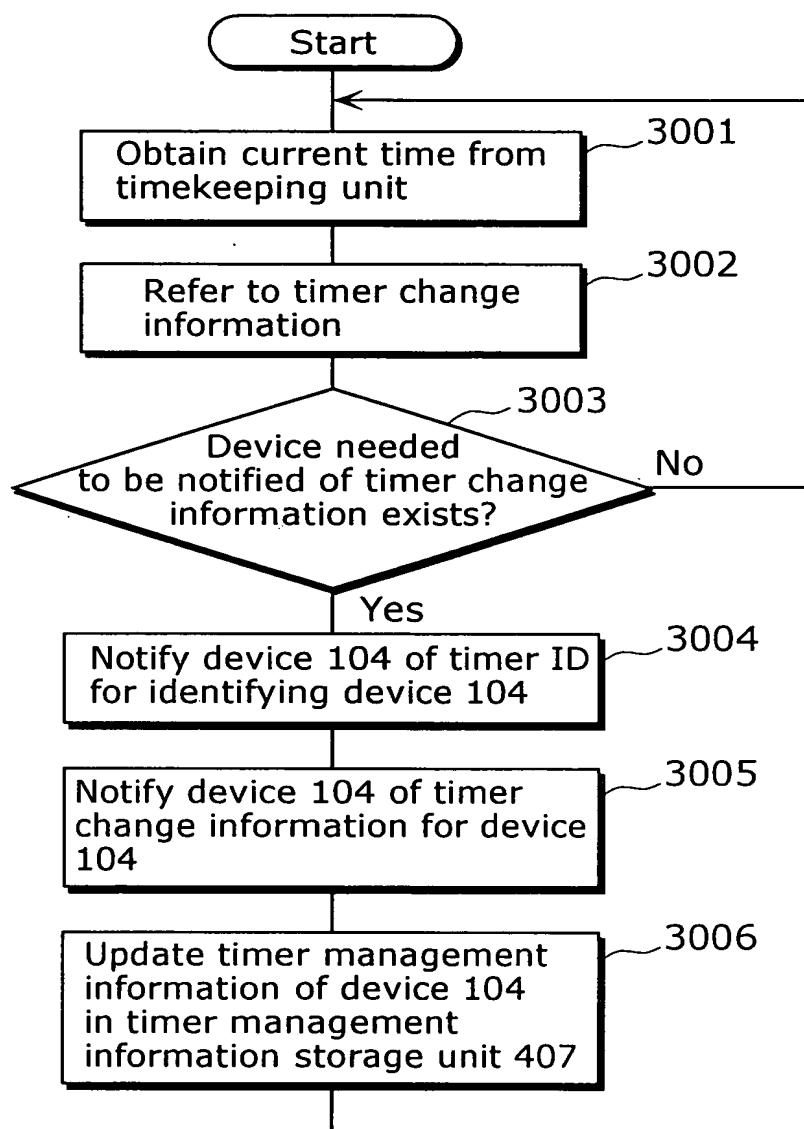


FIG. 80

Timer changing information

Change ID	Change date	Change time	Change device name	Details of change	Setting time
001	Immediate execution	Immediate execution	Air conditioner	Setting of power ON time	05:30:00
002	Immediate execution	Immediate execution	Rice cooker	Setting of end cooking time	06:30:00
003					
004					



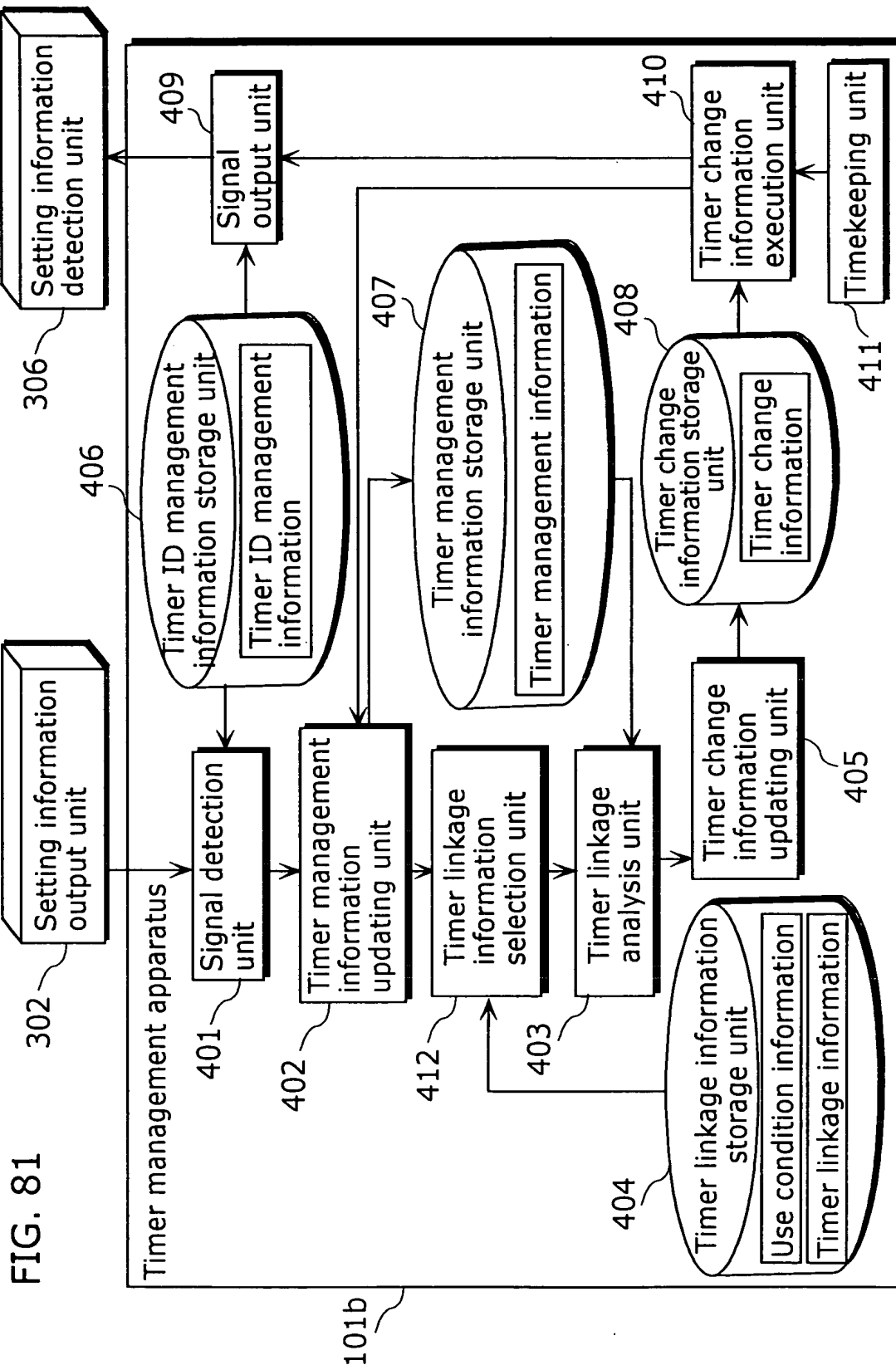


FIG. 82

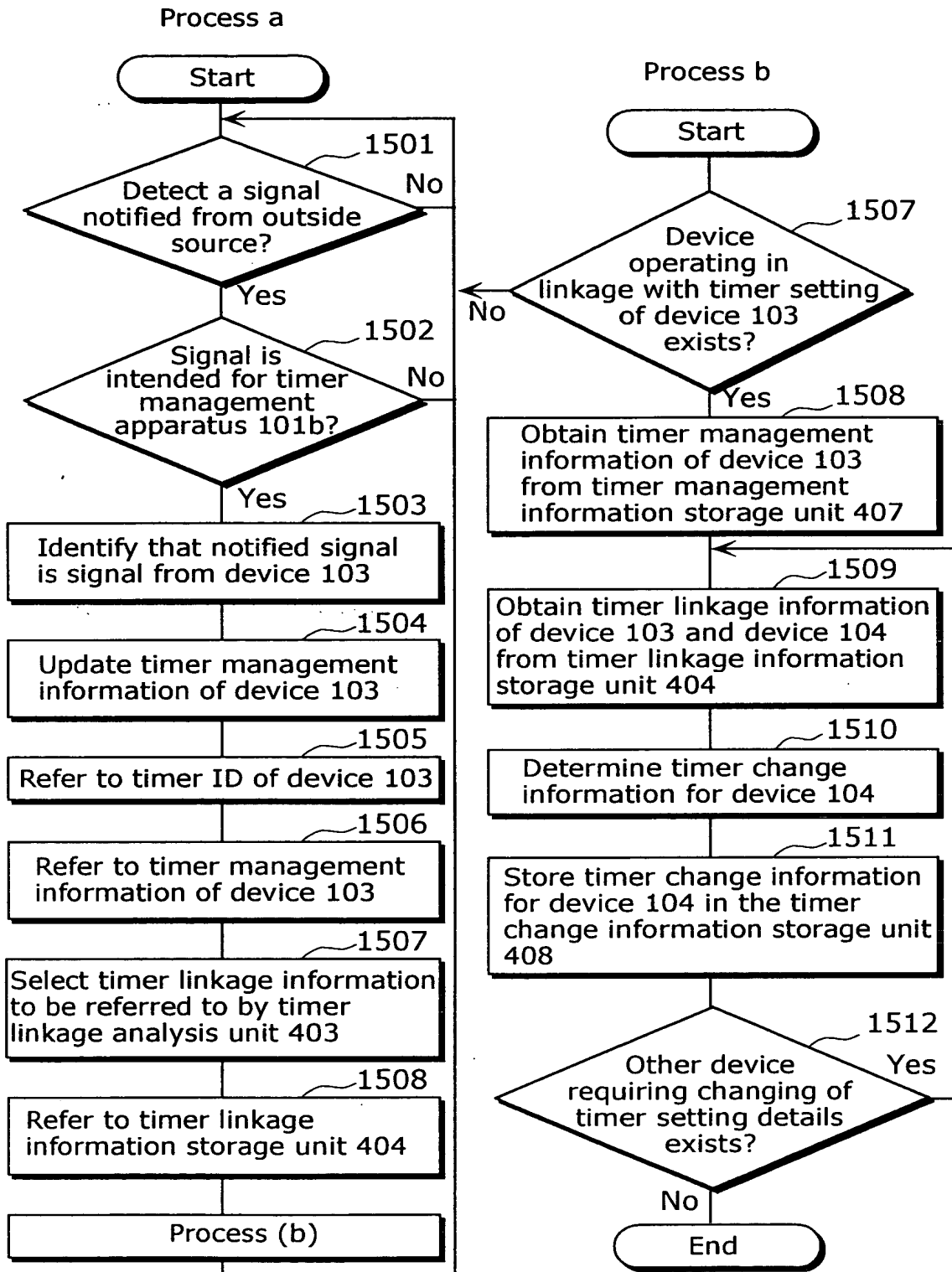


FIG. 83

Condition selection information

Timer linkage information ID	Distinguishing information (Time)	Distinguishing information (Day of the week)
ID:001	5:00–5:59	
ID:002	6:00–6:59	
ID:003	7:00–7:59	
ID:004	8:00–8:59	
ID:005	9:00–9:59	

FIG. 84

Timer linkage information ID	Distinguishing information (Time)	Distinguishing information (Day of the week)
ID:001	5:00-5:59	
ID:002	6:00-6:59	
ID:003	7:00-7:59	
ID:004	8:00-8:59	
ID:005	9:00-4:59	

(Condition selection information)

ID:002			
Timer ID	001 Air conditioner	002 Alarm clock	003 Rice cooker
001 Air conditioner	0	30min	60min
002 Alarm clock	-30min	0	30min
003 Rice cooker	-60min	-30min	0
004 Television			0
ID:003			
Timer ID	001 Air conditioner	002 Alarm clock	003 Rice cooker
001 Air conditioner	0	30min	60min
002 Alarm clock	-30min	0	30min
003 Rice cooker	-60min	-30min	0
004 Television			0
ID:004			
Timer ID	001 Air conditioner	002 Alarm clock	003 Rice cooker
001 Air conditioner	0	30min	60min
002 Alarm clock	-30min	0	30min
003 Rice cooker	-60min	-30min	0
004 Television			0
ID:005			
Timer ID	001 Air conditioner	002 Alarm clock	003 Rice cooker
001 Air conditioner	0	30min	60min
002 Alarm clock	-30min	0	30min
003 Rice cooker	-60min	-30min	0
004 Television			0

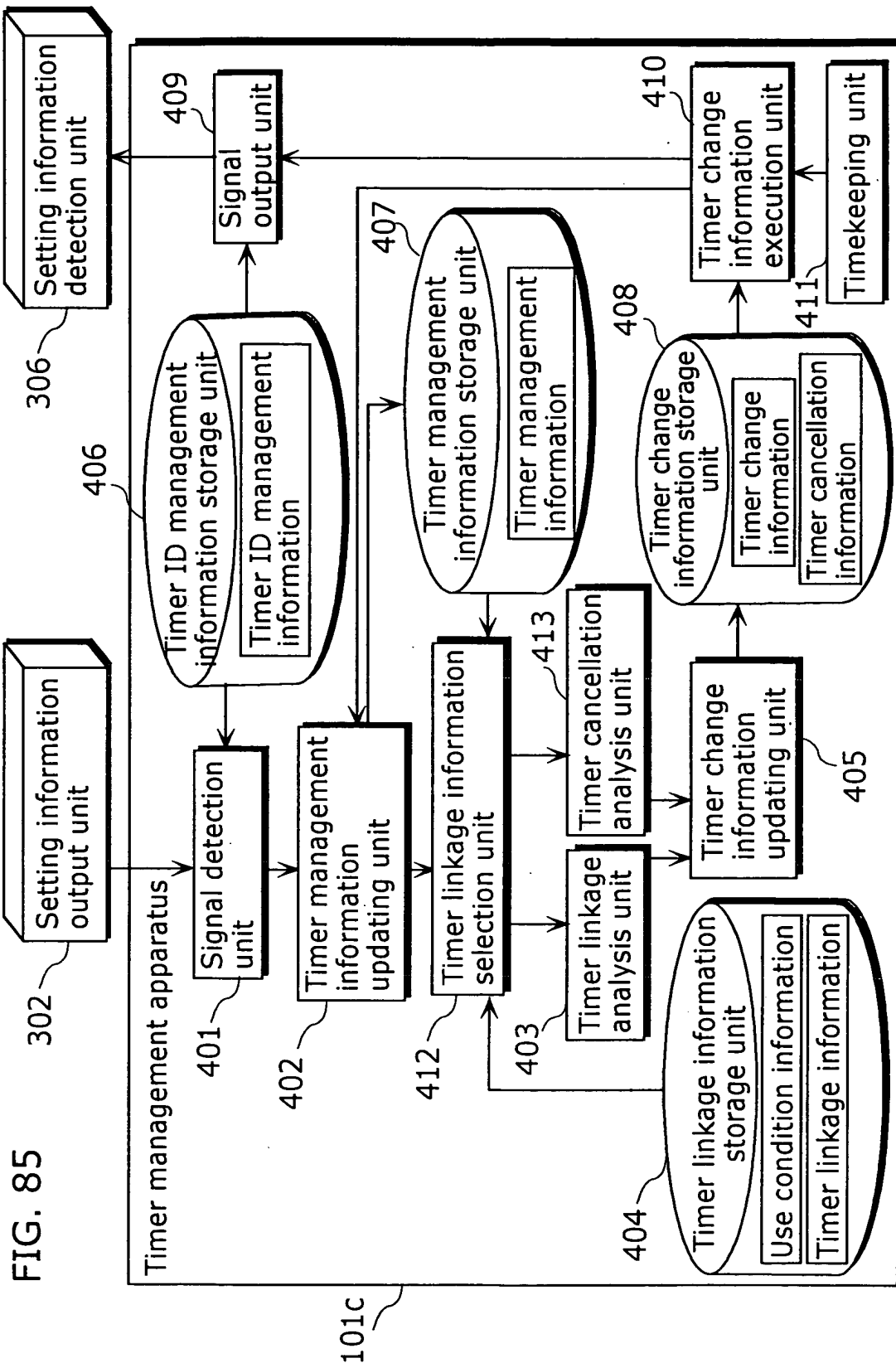


FIG. 86

Timer management information

Timer ID	Date	Time	Name	Details of operation	Status
001	02/01/15	05:30:00	Air conditioner	Power ON	Valid
002	02/01/15	06:00:00	Alarm clock	Alarm start-up	Valid
003	02/01/15	06:30:00	Rice cooker	End cooking	Valid
004	02/01/15	07:30:00	Television	Power ON	Cancelled
005					

FIG. 87

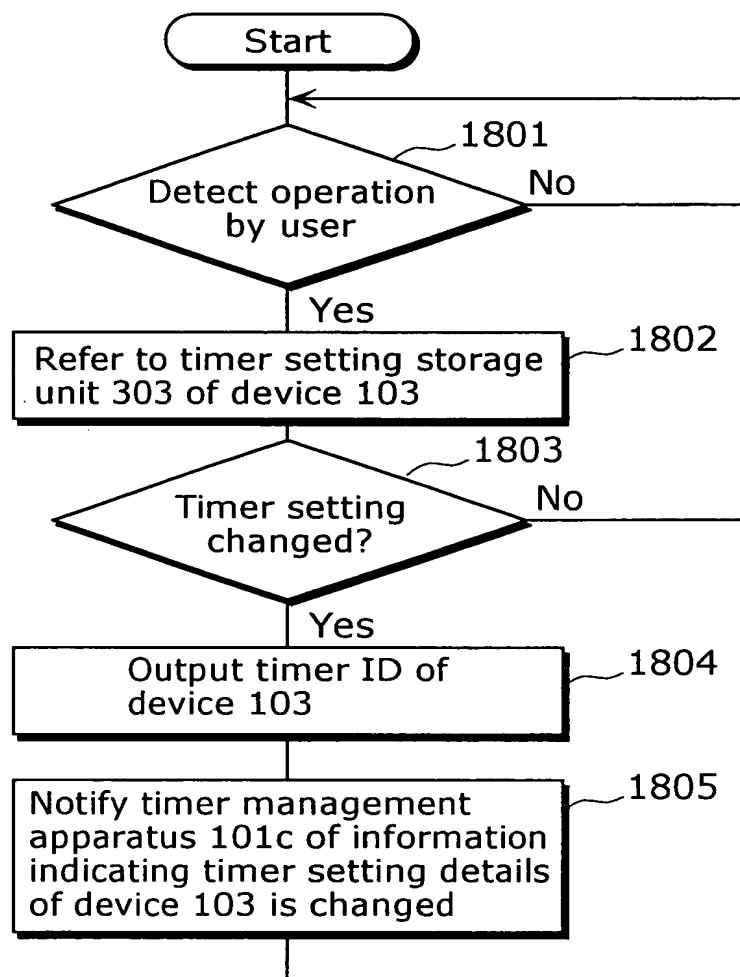


FIG. 88A

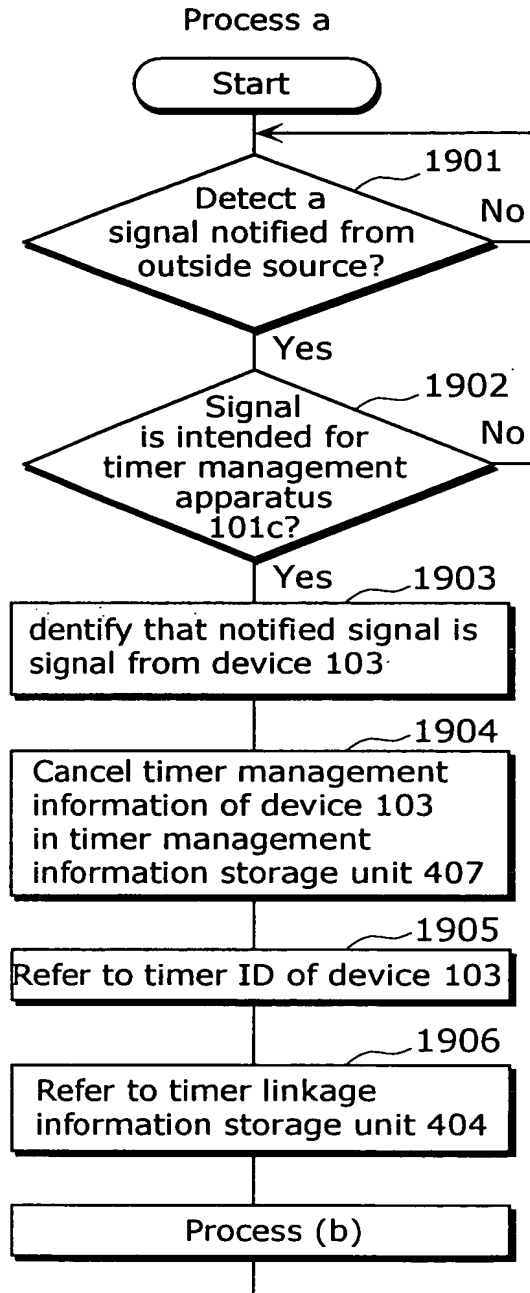


FIG. 88B

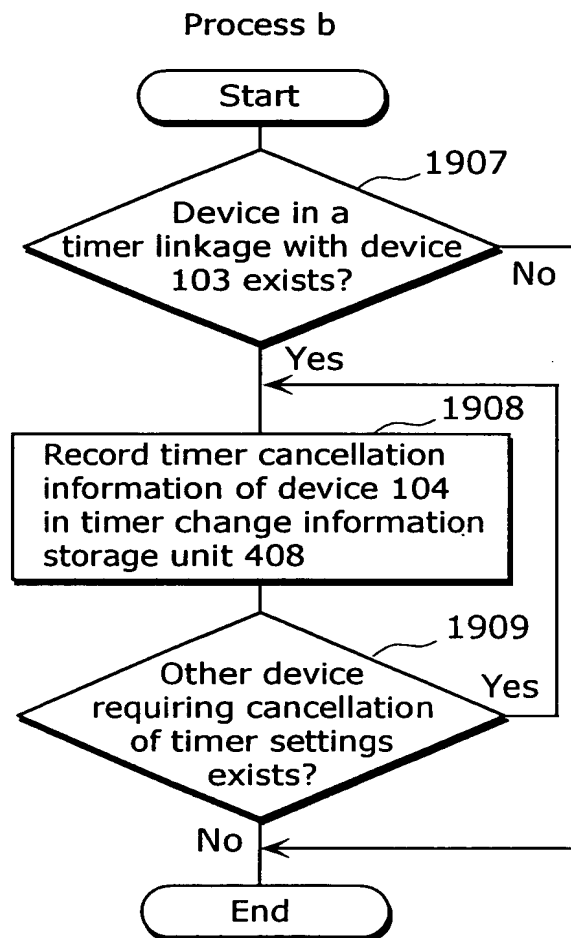




FIG. 89

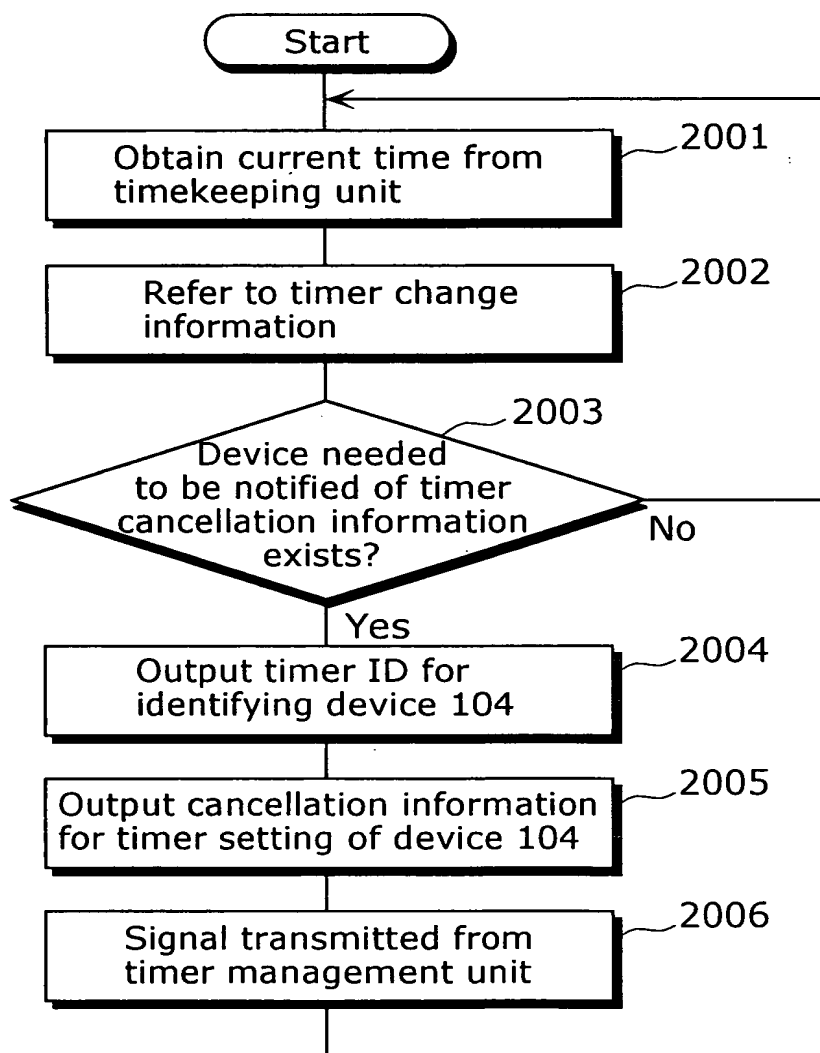
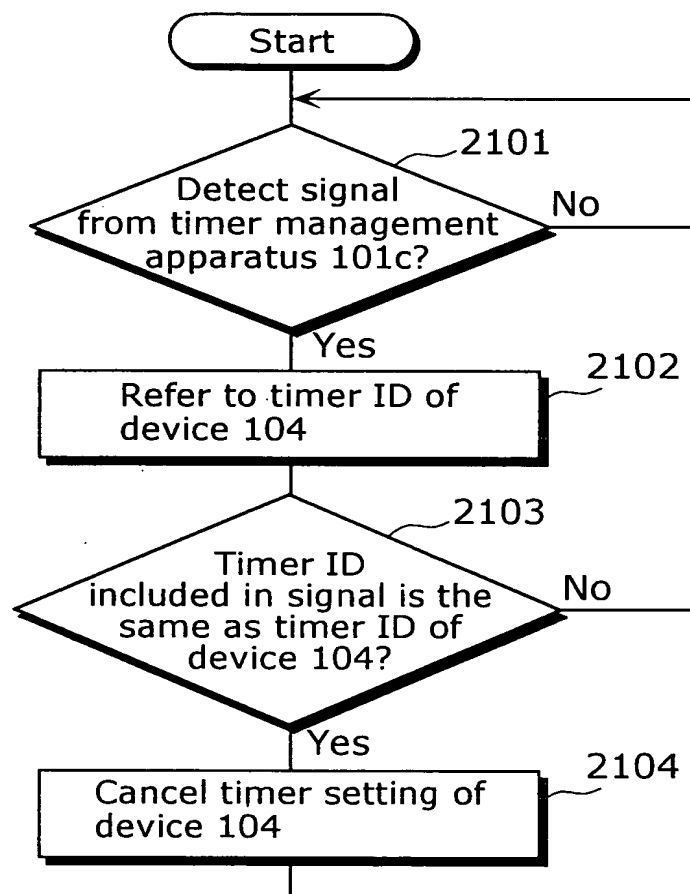


FIG. 90



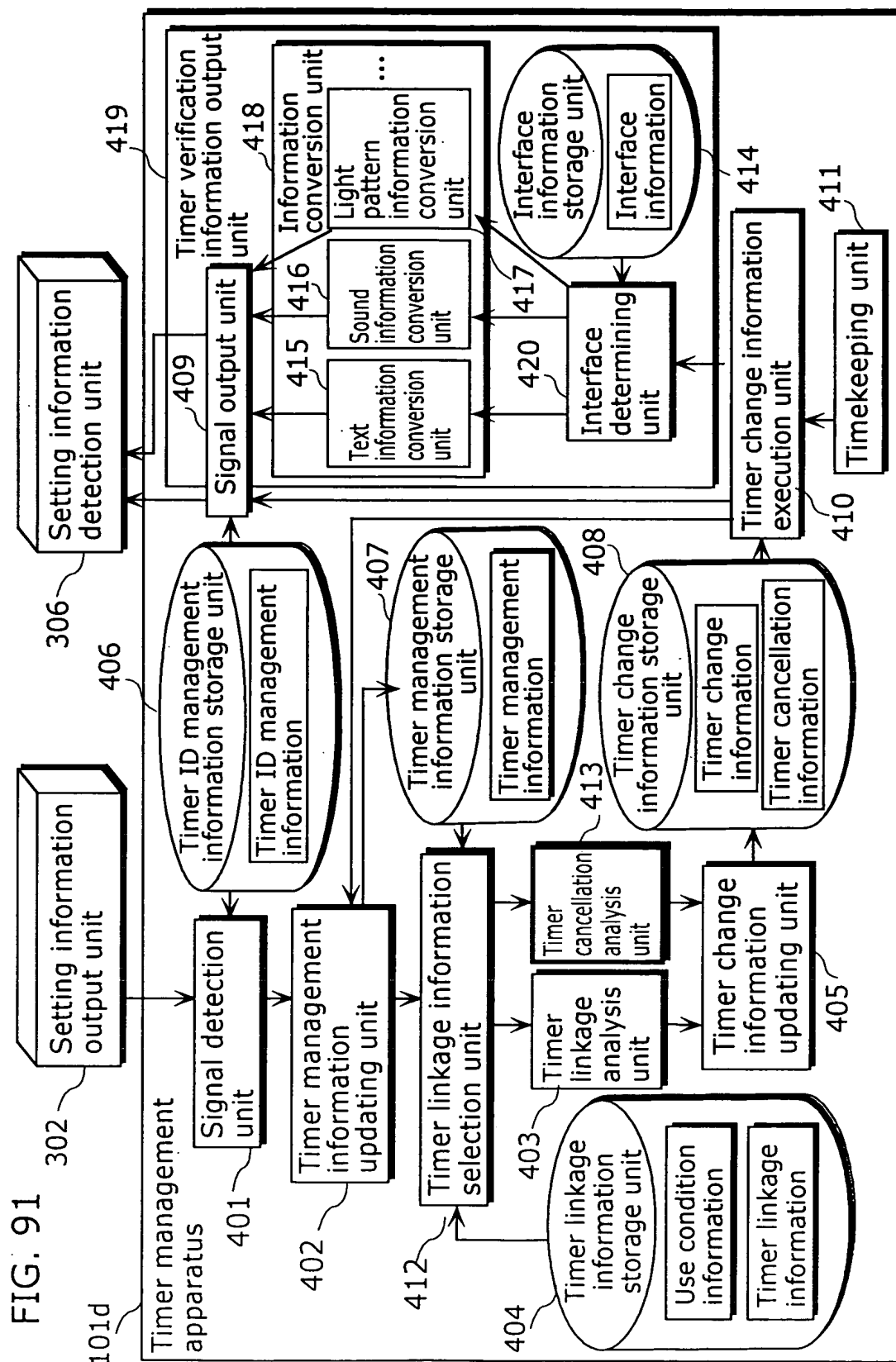


FIG. 92

Interface information

Timer ID	Device name	Interface
001	Air conditioner	Display
002	Alarm clock	Speaker
003	Rice cooker	LED
004	Television	Display, speaker

FIG. 93

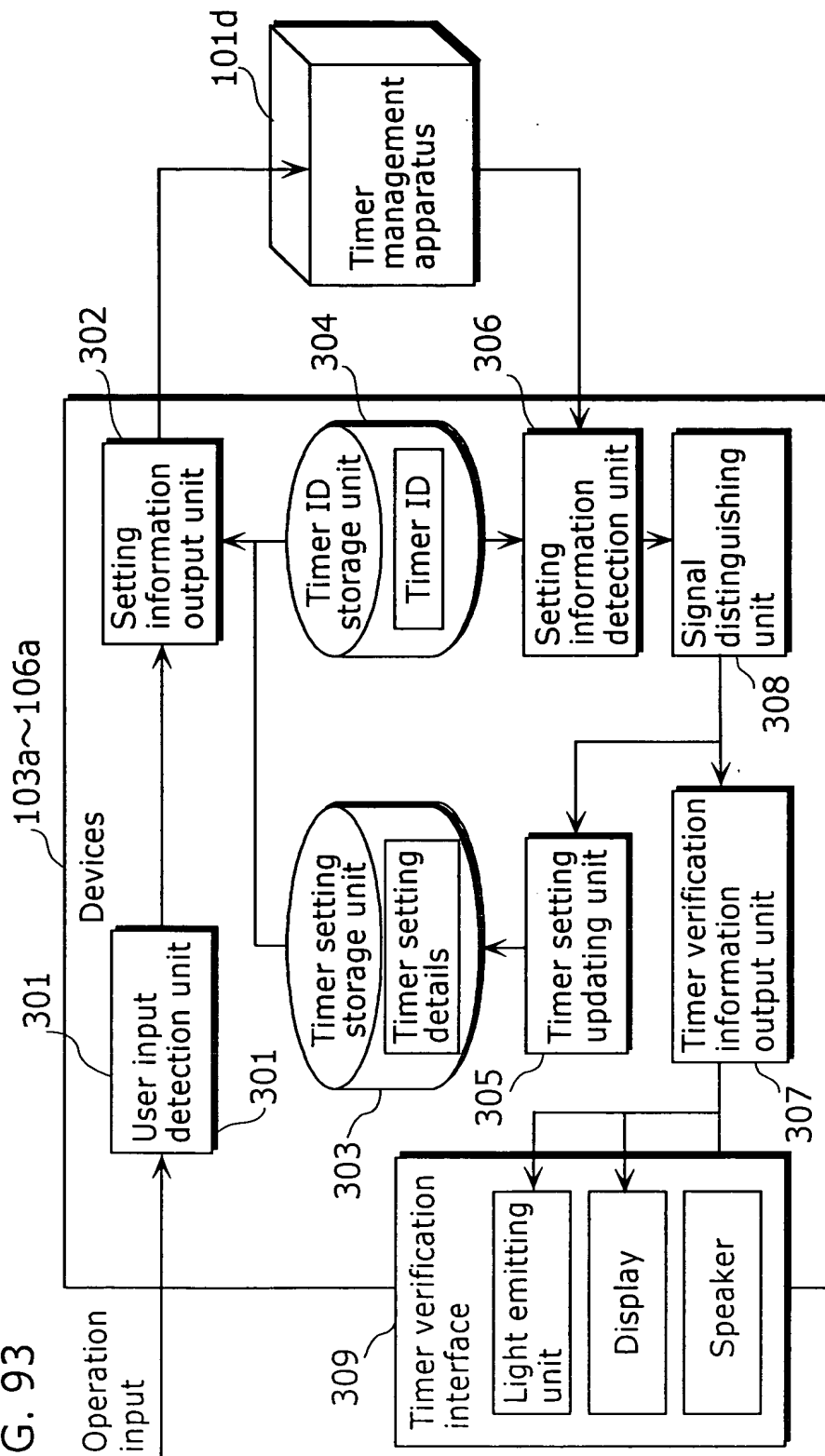


FIG. 94

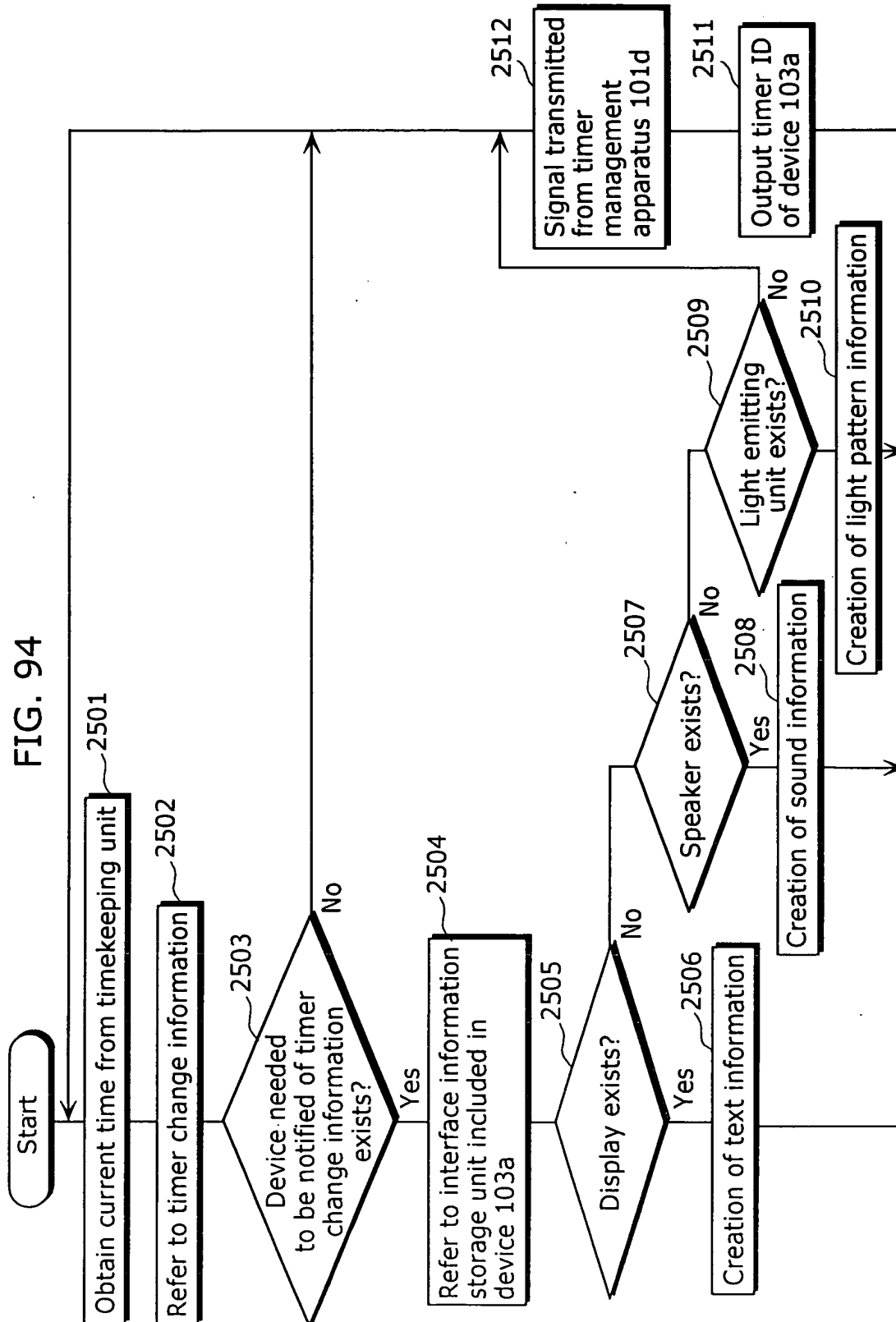


FIG. 95

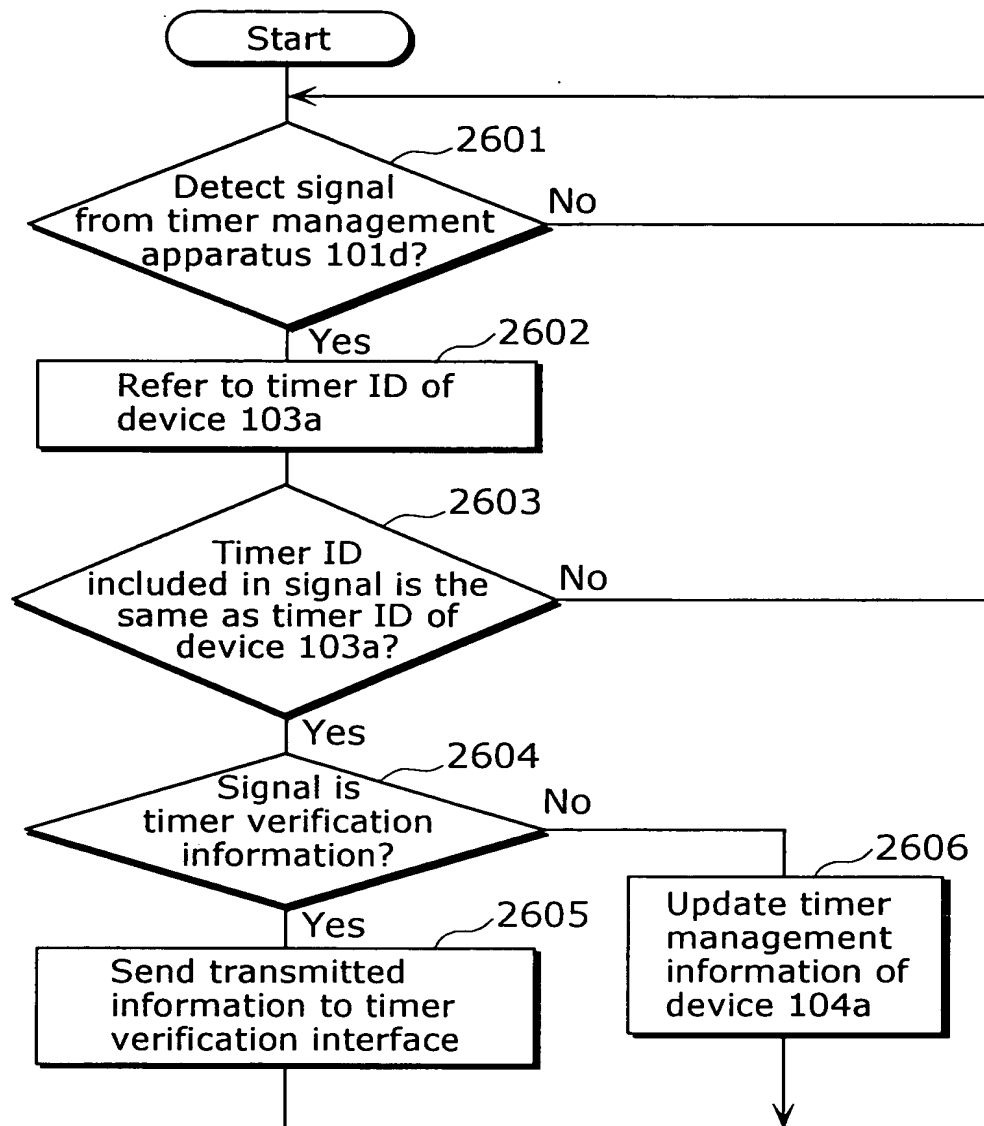
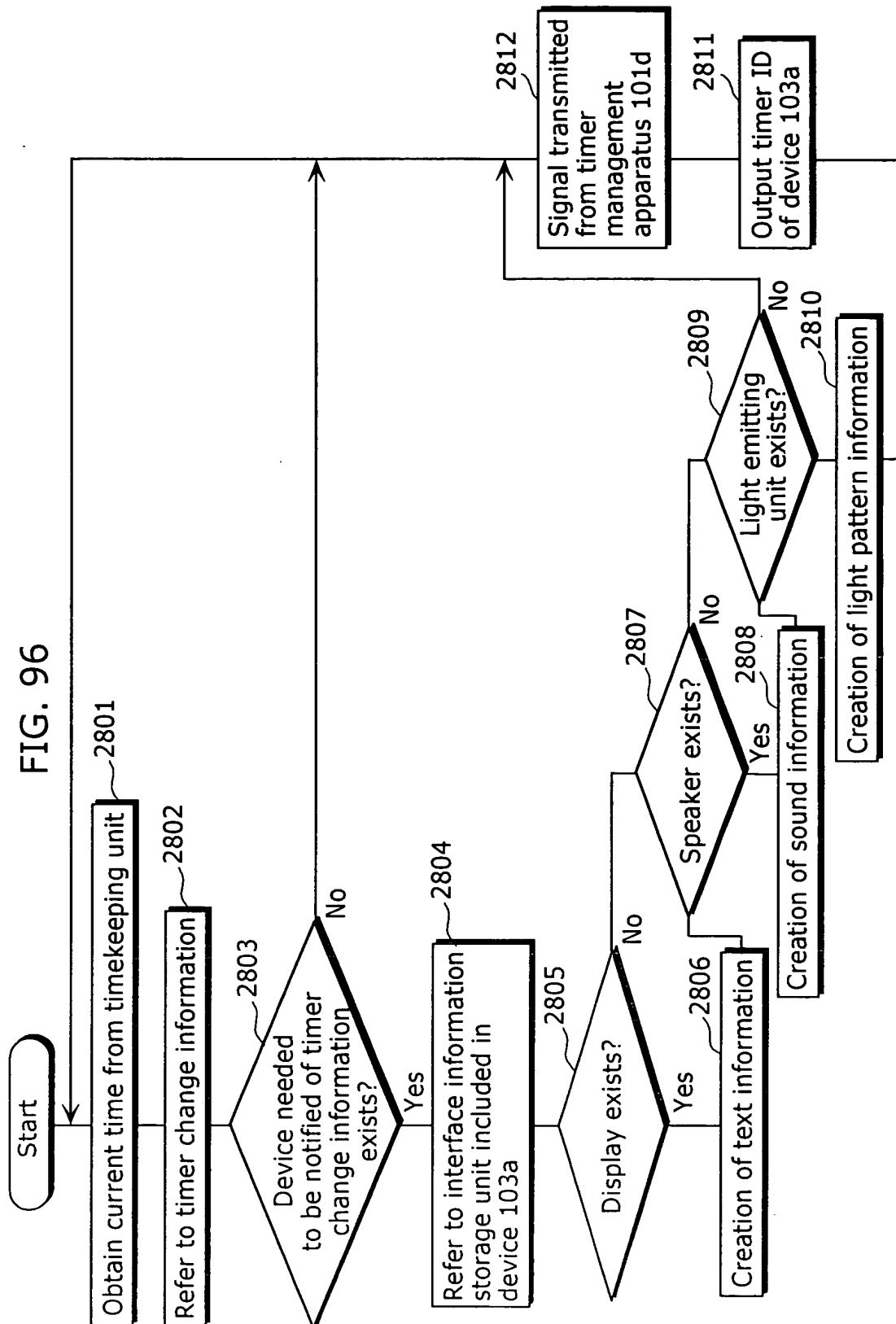


FIG. 96





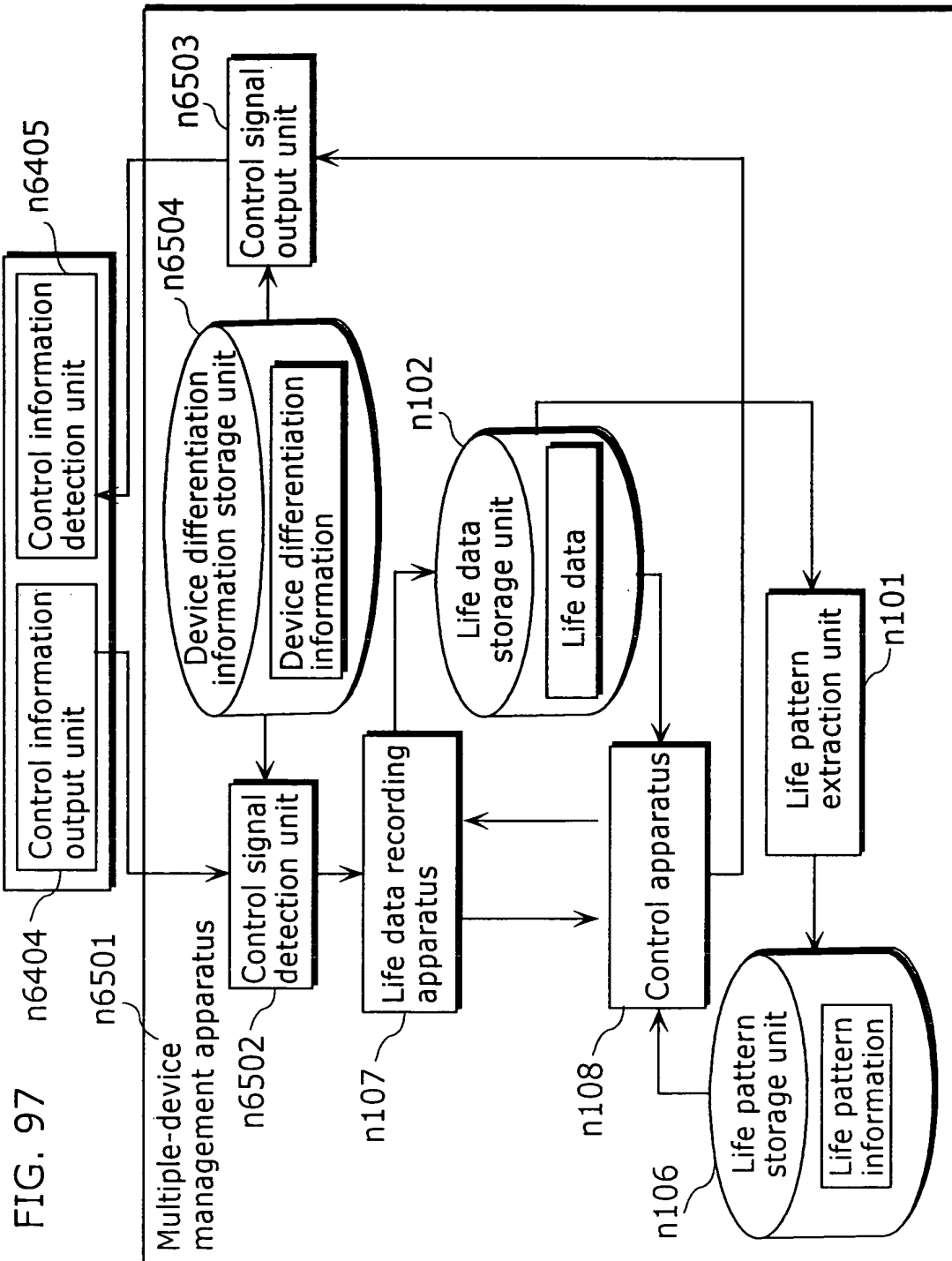


FIG. 98

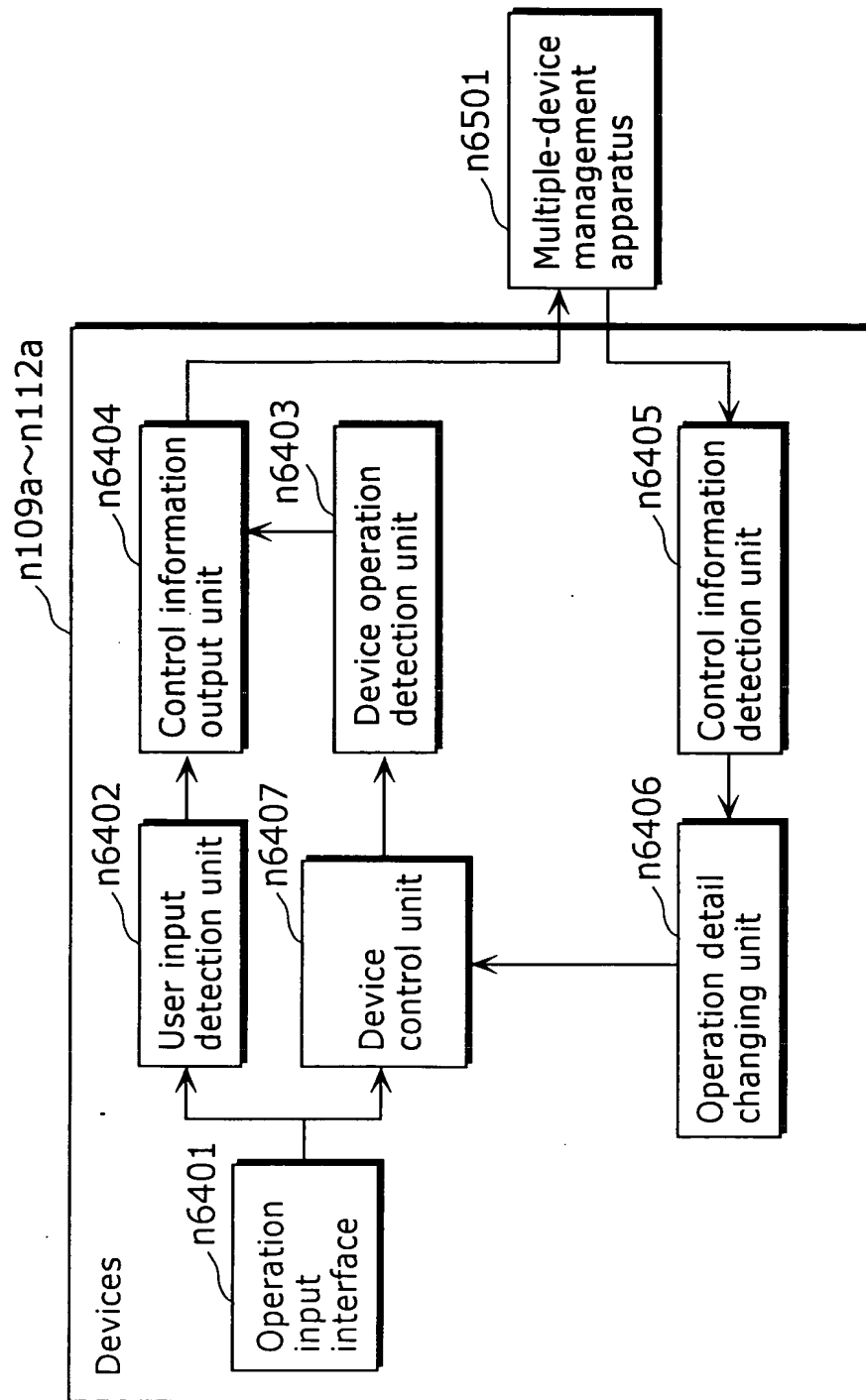


FIG. 99

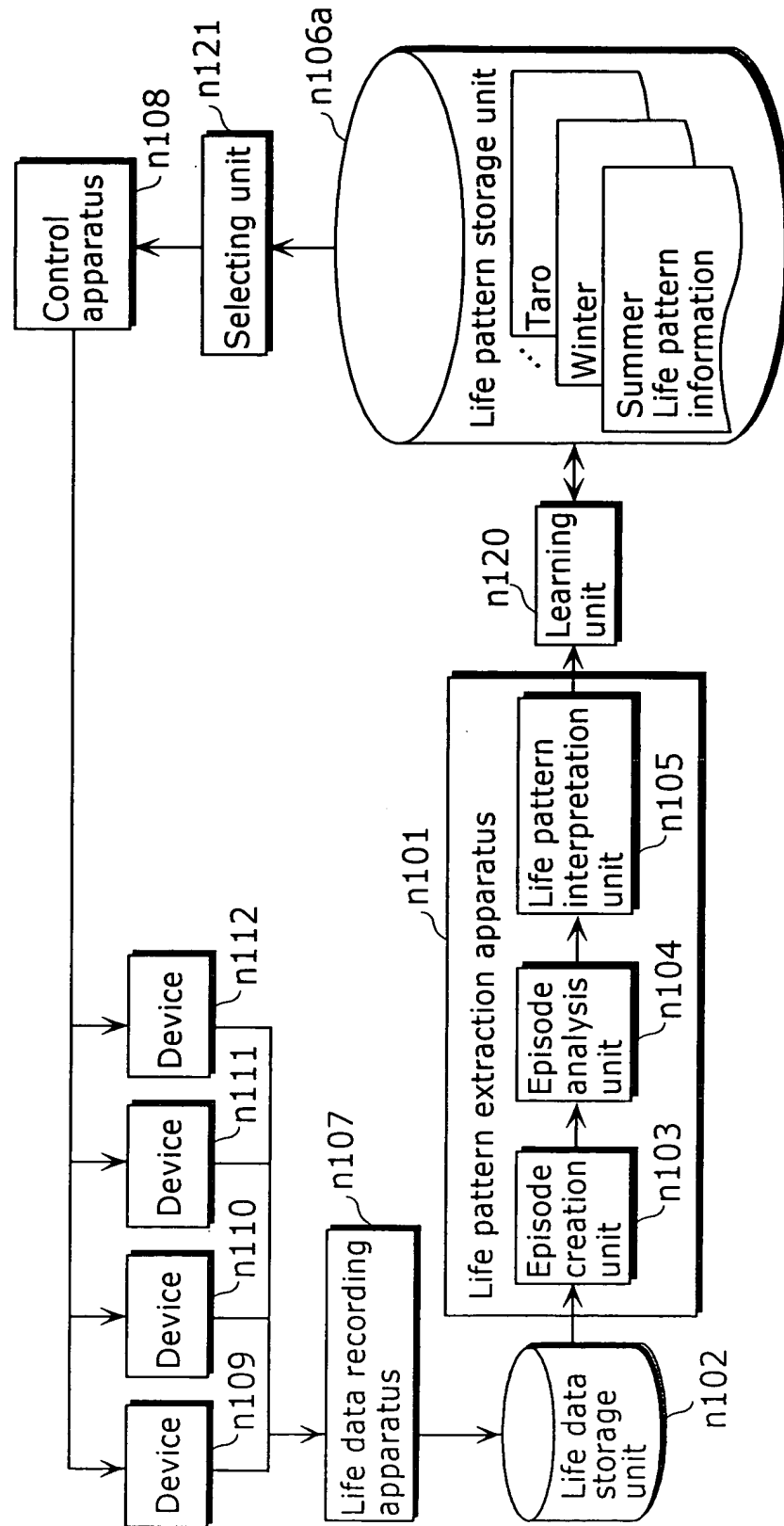


FIG. 100

